modern machine shop

FEATURES IN BRIEF
See Page 2
MACHINE TOOL DISTRIBUTION
See Page 102
MACHINING EXPLOSIVES
See Page 138

JANUARY
1958

SOLVE
Bearing Space Limitation Problems
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EXTRA LIGHT
XLS Series Precision Bearings

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- Have unusually large bores compared to outside diameter
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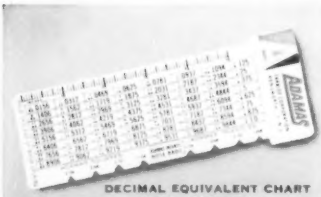
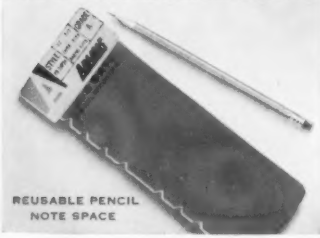


DECIMAL EQUIVALENT CHART AND RADII GAUGE



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modern machine shop

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Member

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modern machine shop

features in

JANUARY 1958

CUSTOMERS SPEAK ON MACHINE TOOL DISTRIBUTION AND ENGINEERING SERVICES

By E. W. Allen, Frank Gill and P. N. Cravaritis

This article is based on a series of interviews conducted by the American Machine Tool and Distributors' Association with three executives of important manufacturing companies.

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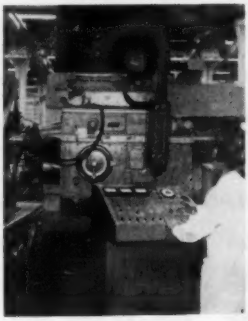
WHAT HAPPENS WHEN YOU EMPLOY NUMERICAL CONTROL?

By Leon E. Laux



Anyone considering the use of numerically controlled equipment may well profit from a reading of this first-hand account of pioneering experience at The Martin Company.

Page 108

RANDOM SHOTS AT THE METAL SHOW

Several photographs taken of various booths and operating displays at the recent Metal Show held in Chicago are included in this section.

Page 116

SEARCH FOR MODERN METALS

By E. C. Bishop

The author tells how better, stronger, purer metals are being produced today for tomorrow's metal parts and products.

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this issue

VOL. 30 • No. 8

IDEA TO FINISHED PRODUCT

By Roger J. Kuhns

This interesting and unusual story answers some of the questions which arise for the company that looks around for manufacturing facilities to help build a product.

Page 128

MACHINING STAINLESS STEEL

By G. J. Stevens

The turning of a fuel control valve made of 17-4 PH stainless steel is the subject of this interesting case history.

Page 136

MACHINING EXPLOSIVES

Remote controls, including closed circuit television, make it safe for operators to machine explosives on a semi-automatic type of engine lathe in use at the Chemistry Research Department of the U. S. Naval Ordnance Laboratory.

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MODERN MACHINE SHOP 1957 ARTICLE INDEX

This index provides a convenient subject listing of articles published in *Modern Machine Shop* during the past year. It is our suggestion that the readers of this magazine save this index for future reference purposes.

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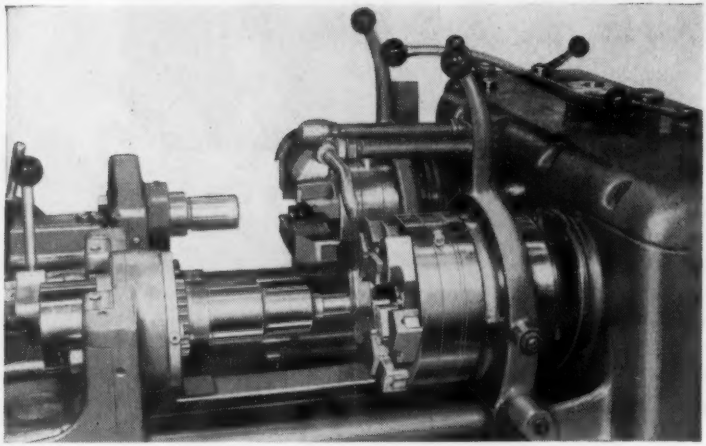
modern machine shop



3/4" -4.320" *Threading Range*

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457-2

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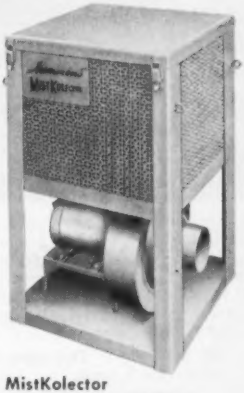

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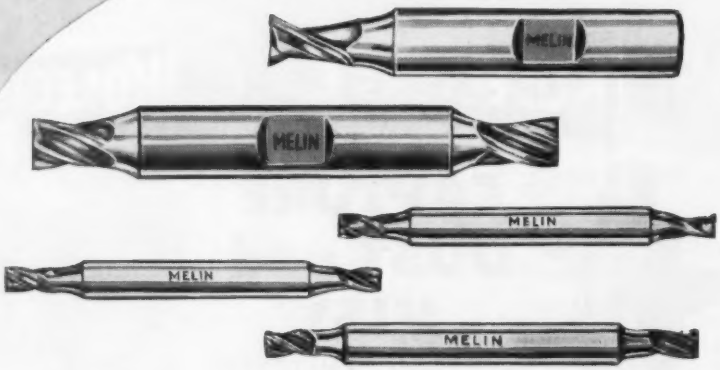

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Aram Kalenian,
President.

WHAT THE CLEVELAND DIALMATIC DOES FOR VEE-ARC... IT CAN DO FOR YOU!

Aram Kalenian, writer of the letter reproduced above, and president of Vee-Arc Corp., is shown with Ralph Rastad, superintendent, and Paul Daoust, operator, examining a chucking job run on their 3" Model AB Cleveland Dialmatic.

The parts shown (some are blanked out, others are machined complete) are typical of those produced on the Model AB 3" Cleveland Single Spindle Automatic at the Vee-Arc Corp. Diameters of these parts range from 5/8" to 4 1/4", and materials include aluminum, type 303 stainless, and tough, cold hobbing steel.

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3124	¾"	¼"	$4.35
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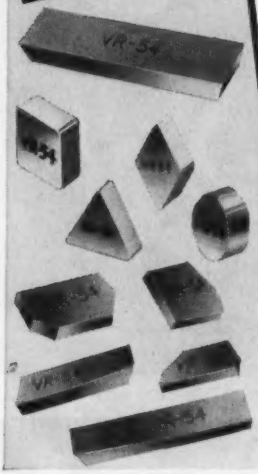
VR-54



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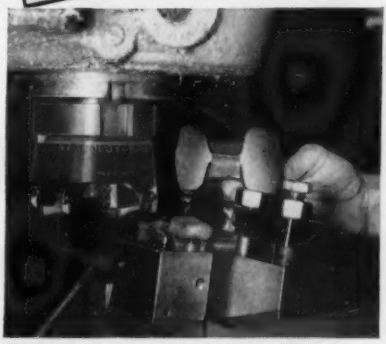

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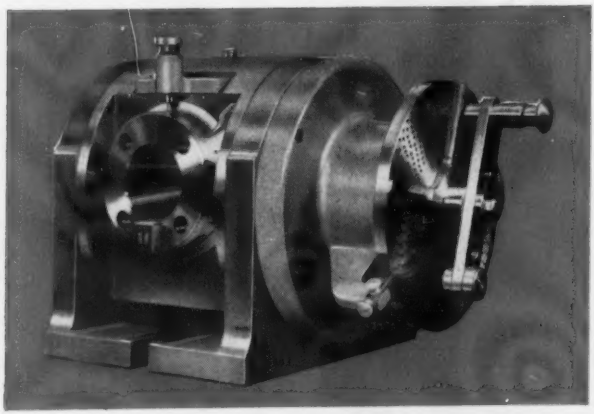
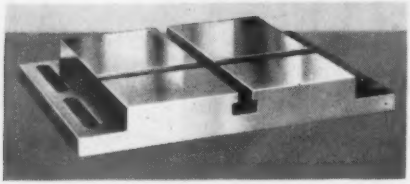
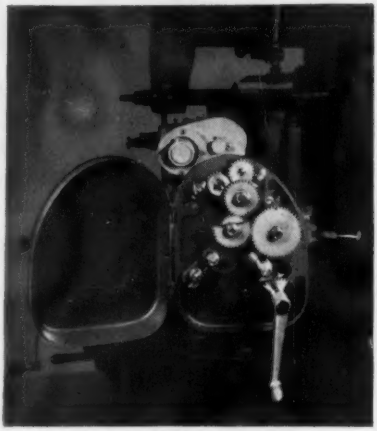
SUPPORTING TEAM

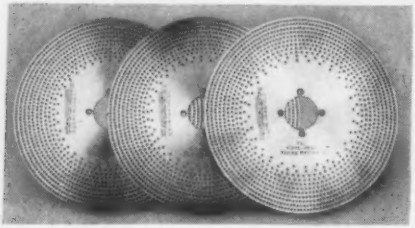




RIGHT ANGLE PLATES for offsetting the Dividing Head from the table T-slots, or setting it up to face the machine spindle. Publication No. M-644-1.



ENCLOSED DRIVING MECHANISM for driving Dividing Heads. Lead range 2½" to 100". Publication No. M-1755.



HIGH NUMBER INDEXING ATTACHMENT. These plates interchange with standard index plate supplied with CINCINNATI Dividing Heads. Indexes all numbers up to 200 and many beyond. Publication No. M-987.

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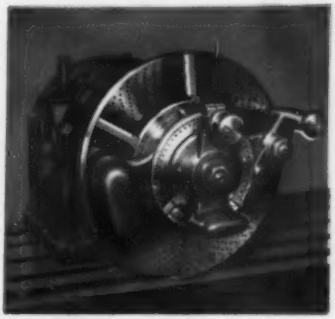
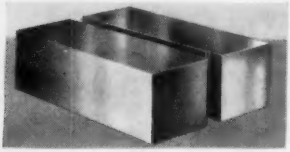
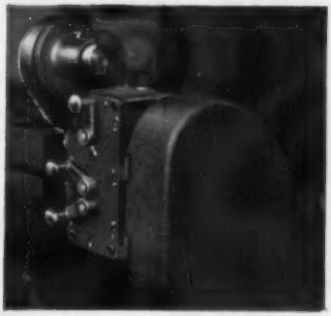
CINCINNATI 9, OHIO



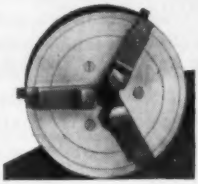
WIDE RANGE DIVIDER. A built-in unit for divisions up to 400,000. Exact angular divisions, too, intervals of six seconds. Publication No. M-1842.



RAISING BLOCKS. Give your Dividing Head the benefit of accurately made Raising Blocks. Supplied in pairs: 2", 2½" and 3" high. Publication No. M-644-1.



SHORT AND LONG LEAD DRIVING MECHANISM for driving Dividing Heads mounted on Universal Dial Type Millers only. Lead range .010" to 1000", or .025" to 3000". Publication No. M-1887.



CHUCK. Three jaw universal type. Has threaded flange to facilitate mounting on spindle nose of Dividing Head. 6" and 9" sizes. Publication No. M-1755.

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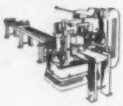

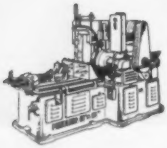

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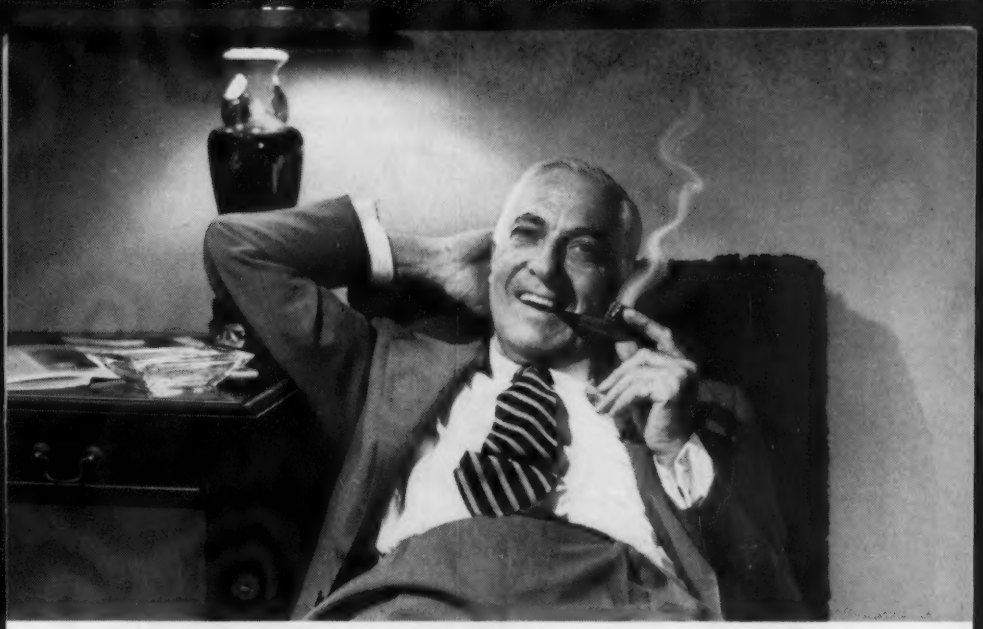

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CIMCOOL **Concentrate**—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

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The TREE 2VG Vertical Mill provides unusual capacity and rigidity; 12 geared speeds ranging from 50 to 2500 RPM; a geared-in-ram mill having capacity to handle cutters up to 4″ diameter and with 6″ quill travel. Ram is dovetail type with integral gear box and 3 H.P. motor mounted.

TREE TOOL AND DIE WORKS
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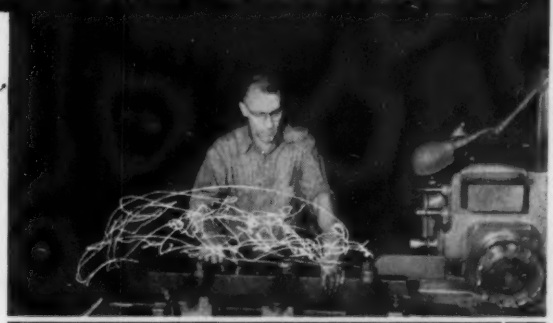
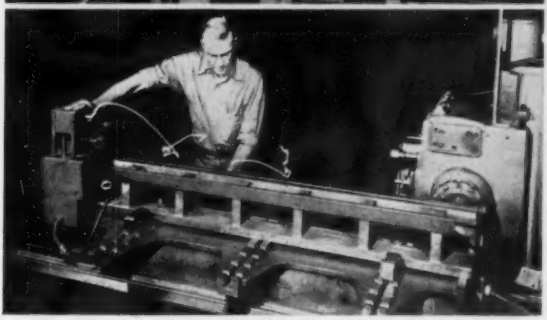
MAJOR TIME SAVINGS

...result from shift to magnetic clamping





Wrist lights tell the story in these two photos. The job is the same—only the clamping method changes. Note how the excessive motion required with mechanical clamping (top view) is eliminated with the change to Sundstrand magnetic clamping (lower view).

Longer tool life, greater clamping uniformity, and a significant reduction in operator fatigue are a few of the outstanding benefits you are sure to get with magnetic clamping. A quick check on its application to your jobs will show you others.

FREE DATA about Sundstrand magnetic clamping fixtures is available in Bulletin 587-M. Write for your copy today.

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SUNDSTRAND

Magnetic - Pneumatic Products

Division of Sundstrand Machine Tool Co.

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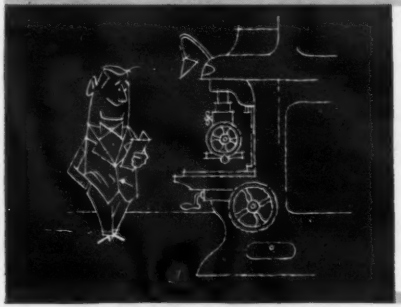
TOOLING FOR COMPETITION

1958 ASTE TOOL SHOW AND CONFERENCE

CONVENTION CENTER • PHILADELPHIA, MAY 1-8

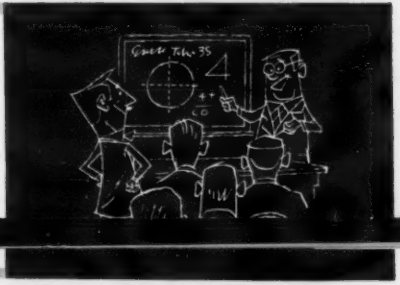


SEE all the very latest advances and improvements in more than thirty major categories of industrial products.

It's the year's most notable industrial event . . . it's your chance to see tooling's future, *your* future on display. See thousands of products, hundreds of demonstrations, presented by 487 exhibitors. Don't miss it! Plan *now* to attend.

ATTEND top-level conferences, conducted by recognized authorities, on the newest production techniques and developments.

Symposia, panels and technical papers will be devoted to subjects of vital interest to you . . . subjects like: Automation • Metal Cutting



Symposia, panels and technical papers will be devoted to subjects of vital interest to you . . . subjects like: Automation • Metal Cutting

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Meet them all . . . the designers, deciders, doers . . . at industry's greatest open forum for exchanging ideas, solving problems, *"tooling for competition"*. Keep yourself informed, up-to-date . . . what could be more important today?

INSPECT the modern equipment and up-to-the-minute manufacturing methods being utilized in booming Delaware Valley plants.

See industry in action. Inspect such Philadelphia area plants as: Standard Pressed Steel • U.S. Steel • U.S. Navy Yard • Leeds & Northrup • Schramm, Inc. • Chrysler-Plymouth • Yale & Towne • Link-Belt • Budd Company • Brown Instrument.

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TOOL SHOW CONFERENCE '58 MAY 1 TO 8

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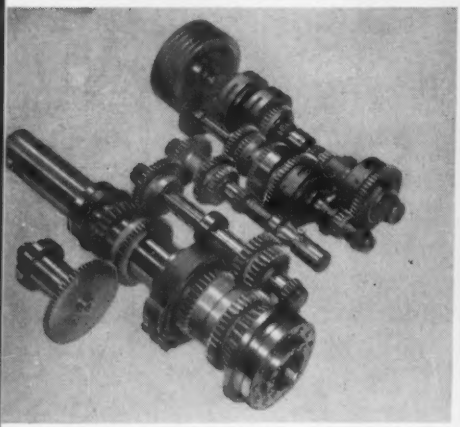


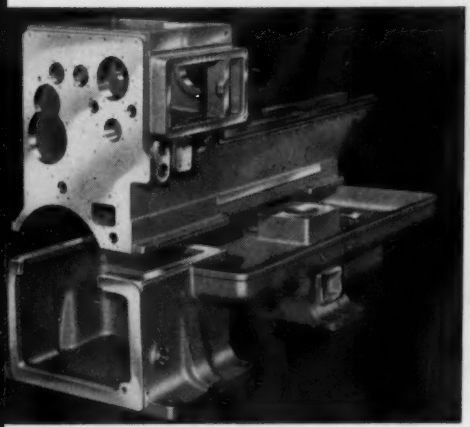
NEW HEADSTOCK GEAR TRAIN—sixteen different spindle speeds available, powered by up to 30 h.p. single-speed driving motor delivering full power at all speeds. Spindle is mounted on selected pre-loaded, precision-tapered roller bearings. Heavier, more rugged design provides smoother, quieter power.

HYDRAULIC SPEED SELECTOR—smooth, effortless speed changes. No waiting, no computing, no stopping of spindle, no releasing of main drive clutch. Operates direct or pre-set. Hi-Lo Lever permits instantaneous speed changes in 8:1 ratio without moving Speed Selector handwheel. Multiple Disc Clutches have automatic take-up for wear.

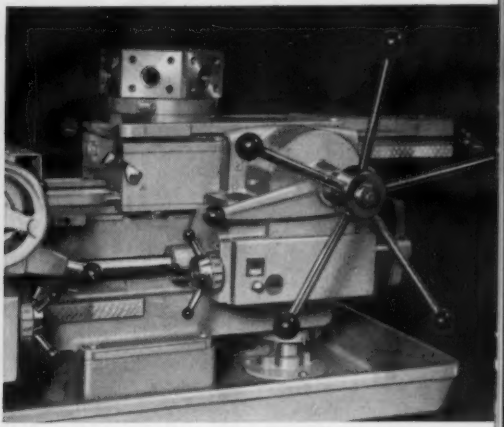
YOU GET THEM ALL...PLUS

NEW GISHOLT MASTERLINE

WANT HEAVY CUTS WITHOUT VIBRATION?



NEW HEADSTOCK AND BED CASTING—scientific design dampens out vibrations, assures smooth operation and simplifies holding closer tolerances. Made from semi-steel, poured in Gisholt's own foundry. Greater swing over ways permits bigger chucks and broader range of workpiece sizes. Provides a solid foundation for all types of work.



NEW TURRET RAM AND SADDLE—designed wider, heavier, more rigid to handle increased capacity and higher speeds. Dial-type feed selector makes feed changes faster, easier. Turret ram rigidly supported on 64-66 Rockwell C alloy steel way strips. Power transmitted through serrated tooth clutches, with shear pin protection against overloading.

GREATER VERSATILITY...WITH THE

RAM TYPE TURRET LATHE

YOU'LL SPEED UP your production jobs—both large and small—with this more powerful, more versatile Gisholt MASTERLINE Ram Type Turret Lathe.

Here is a machine designed from end-to-end for easier setups, faster change-over and higher productive output than ever before. Check the advanced features illustrated above. Note the reserve power to handle your heaviest cuts—and to meet your tooling requirements of tomorrow. Note the extra spindle speeds—all at your operator's finger tips, without computing—for faster, better turning of any type material. And look over the new massive design, the over-all ruggedness that permits greater accuracy, closer tolerances, deeper cuts at punishing feeds without vibration.

Find out now how this powerful, flexible Gisholt MASTERLINE Ram Type Turret Lathe can reduce floor-to-floor time on your specific jobs. Call your Gisholt Representative today—let him show you how this advanced machine can fit most profitably into your production picture. Or write direct to Gisholt for the new literature described below.

READY NOW—all-new, 18-page illustrated Bulletin No. 1174-B, covering features, accessories, tools and floor plans on new Gisholt MASTERLINE Ram Type Turret Lathes. Ask for it!

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GISHOLT MACHINE COMPANY

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TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • PACKAGING MACHINES • MOLDED FIBERGLAS PLASTICS

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POPE engineers and builds 20,000 DIFFERENT motorized and Belt Driven SPINDLES

one of which may be just the one to LOWER YOUR PRODUCTION COST

Here are only a few representative Pope Precision Spindles:

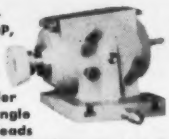
FOR SURFACE GRINDING

POPE 1, 2 and 3 HP Totally Enclosed 1800 and 3600 RPM Motorized, Cartridge Type Spindles with double row cylindrical roller bearings of enormous capacity for superior performance and long life, plus separate thrust bearings for no endwise movement of the shaft.

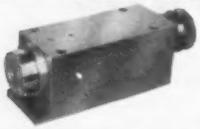
FOR HEAVY DUTY MILLING AND GRINDING

POPE ¾ to 100 HP Direct Motorized Spindles operate in any position — flanged or tapered noses — equipped with super-precision, double-row roller bearings and preloaded ball thrust bearings. Top quality performance is assured on skin milling, grinding, boring and other operations as well as milling.

FOR TOOL AND CUTTER GRINDING



POPE Super-Precision 1 HP, 3600 RPM Motorized Tool and Cutter Grinder Clearance Angle Swivelling Heads provide angular adjustment in a vertical plane. They pay for themselves in time saved. Cup wheels can be used for practically all clearance angles.



FOR BORING ROUND HOLES WITHIN MILLIONTHS OF AN INCH

POPE Heavy Duty Boring Spindles assure smooth, chatter free, continuous high production of accurate parts. Belt driven or motorized, in a wide range of horsepowers and speeds.

FOR INTERNAL GRINDING

POPE Precision Internal Grinding Spindles have the super-precision bearings to withstand both axial and radial loads and to produce better finished ground holes. Their ability to take heavy cuts means increased production. Wheel life is increased, too. For Bryant, Cincinnati, Excello, Heald, Landis and Norton Grinders.

FOR HIGH CYCLE GRINDING AND MILLING

POPE Super-Precision, High Frequency, Heavy Duty Spindles are available for speeds up to 100,000 RPM. They are unequalled for low cost maintenance, long life, trouble-free operation and rugged ability to cut metal fast.

Send us your specifications and get prompt quotations on the one best Spindle for you out of the 20,000 different Precision Spindles that bear the name "POPE."

No. 116

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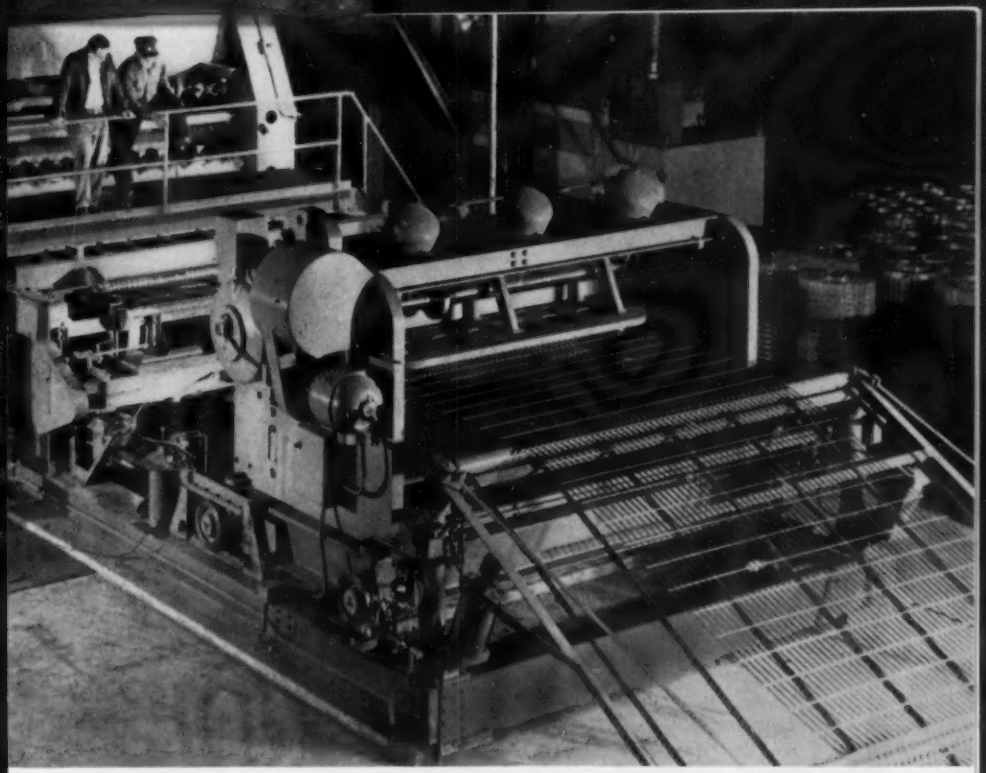

Cincinnati Shear cuts wire mesh at Pittsburgh Steel

The Cincinnati Shear shown is part of an automatic wire welding machine at Pittsburgh Steel Company, Monessen, Pennsylvania. The machine produces wire mesh and fabric used for concrete pipe, buildings, and other applications. The photograph shows the shear cutting forty-seven 2/0 gauge (.331") wires per stroke. The wire is low carbon, cold drawn steel. Other jobs require shearing mesh with wires up to ½" diameter. This shear was specially engineered for this type of application. Because cuts are heavy and production is continuous, Cincinnati dependability is essential.

Standard Cincinnati Shears offer such productive features as powerful hydraulic hold-downs, all-steel interlocked construction, and one-clearance shearing of different metal thicknesses.

Write Department G for Shear Catalog S-7R.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

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Your Bunting distributor is listed in the classified section of your telephone directory usually under Bars—Bronze, and Bearings—Bronze. Two Bunting factories and eleven Bunting Branch Warehouses expedite distribution in all areas. Ask your local Bunting distributor or write for catalogs.

. . . 2211 SIZES . . . *available from stock*

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PRECISION ...Our Key To Your Quality

Diameter	Thickness
1" to 8"	½"
1" to 4"	.006

Spacers are supplied as needed

In Slitting

CIRCLE R precision underwrites *your* precision by holding within very close tolerances, where required. Each of our slitters is made right to do a specific job best and includes single or double bevel, square edge, etc. for slitting textile metallics, sheet steel, rubber, brass, sand paper, etc. Consult your Circle R specialist about slitters for *your* purpose.

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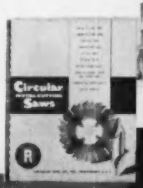

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PROVIDENCE 5, RHODE ISLAND

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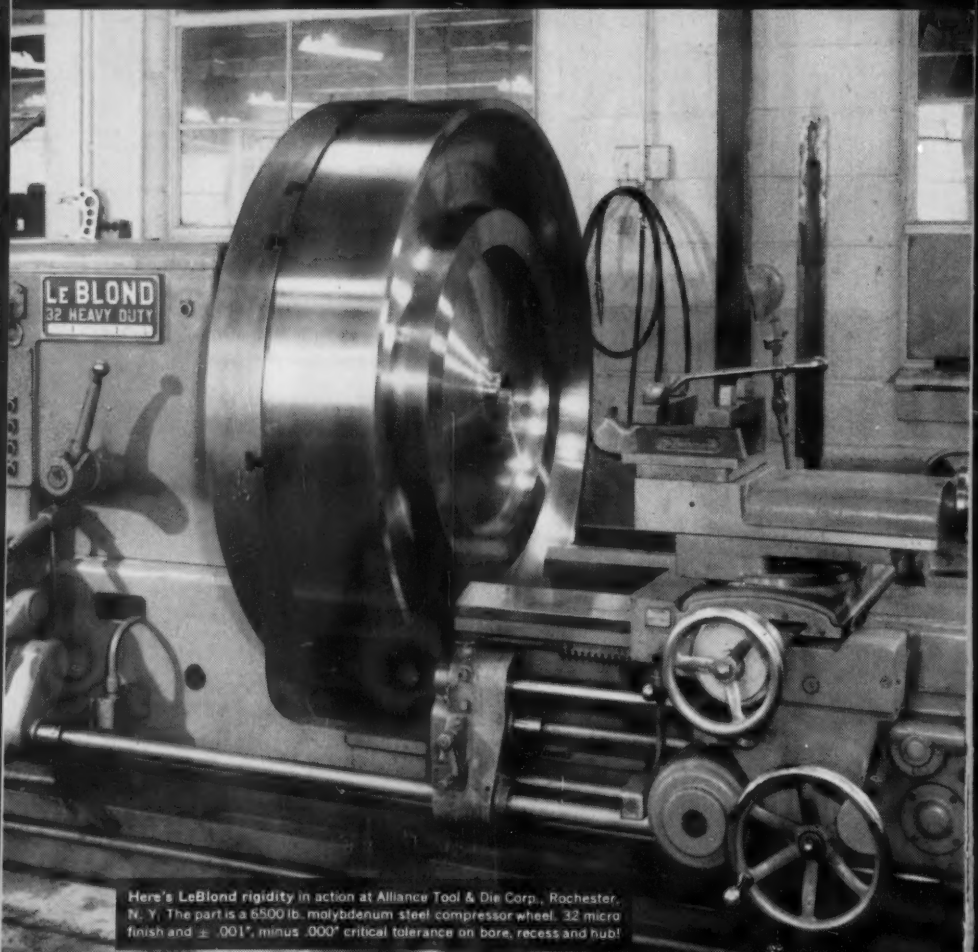
What is the BIGGEST



Here's LeBlond rigidity in action at Alliance Tool & Die Corp., Rochester, N. Y. The part is a 6500 lb. molybdenum steel compressor wheel. 32 micro finish and ± .001", minus .000" critical tolerance on bore, recess and hub!

workpiece your lathes can turn?

Probably your lathes will swing a 32″ piece. Or 40″. But what happens when that occasional 50″ or 60″ job comes along? Chances are you have to say, "We can't handle it. After all, how can you justify a big swing lathe, just for a few big jobs a year?"

Today there *is* a practical and economical solution to this odd-size work problem. LeBlond Sliding Bed Gap Lathes.

Our 32″/60″ Heavy Duty will accommodate work up to 60″ diameter! Basically this is a 32″ lathe. But it has an extendible bed (an upper bed that slides on a lower bed). Slide it to the right, and a gap opens. Now, you have a full 60″ swing! Also, for extra long work, there is 50% greater center distance. And the rest of the time you have a regular 32″ heavy duty lathe for a wide variety of work.

3 lathes in one—at the cost of a lathe and a half!

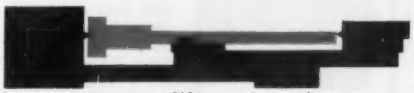
Here's an example of how this extra capacity pays off. Alliance Tool and Die Corp., Rochester, N. Y. are specialists in unusual machining problems, like precision molds—and the bulky compressor wheel, shown here. How did they turn it before? They didn't. The part was too big. Now, with their 32″/60″ LeBlond (recommended by Macaulay Machinery Co., Rochester, N. Y.,) they take jobs like this right in stride. Actually, this particular order was made possible by this lathe.

If you do job shop work, you can consider this lathe a business-getter. If you're doing your own maintenance, it gives you the capacity to do virtually all your own turning work. LeBlond Sliding Bed Gap Lathes are available in 4 sizes—16″/38″, 25″/50″ and 32″/60″ (shown) Heavy Duties and the 17″/28″ Regal. You're sure of getting the right lathe for your job when you buy LeBlond. There are 76 lathe models to choose from. Call your LeBlond Distributor or write.

Here's how the LeBlond Sliding Bed Gap Lathe gives you extra capacity for extra large work:

BED GAP CLOSED—*functions as a regular 32″ lathe.*

BED GAP OPEN—*full 60″ swing.*



BED FULLY EXTENDED—*50% greater center distance.*

. . . cut with confidence

THE R. K. LEBLOND MACHINE TOOL COMPANY
Cincinnati 8, Ohio

LEBLOND of Cincinnati

World's Largest Builder of a Complete Line of Lathes for More than 71 Years

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Time Saving Production and Checking Accessories

Here are three Sundstrand accessories that may prove helpful in your work. A wide range of bench centers and balancing tools are available for checking purposes. The automatic index base has proved a sound addition to many metal working machines. Write for further information.

Bench Centers For Precision Checking

Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

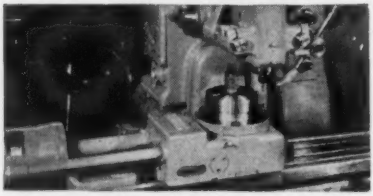
COMPLETE RANGE AS FOLLOWS:

6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

Balancing Tools For Small Medium or Large Work

Sundstrand offers a complete line of balancing tools which will save their cost quickly on truing or balancing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears shafts, fly wheels, pulleys, etc. Standard swing sizes range from 21 inches up to any swing desired. Length between standards ranges from 20 inches to any length desired.

Automatic Index Base For More Production



This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

In many cases, the addition of this Automatic index base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this.

Free Data

Complete specifications are available on these three time saving accessories. Write for your copies today. Ask for bulletin 587.

SUNDSTRAND

SUNDSTRAND MACHINE TOOL CO.

2539 ELEVENTH ST. ROCKFORD, ILLINOIS, U.S.A.

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EMPIRE CUT-OFF BLADES (Luers Type)

FIGHT FRICTION . . .

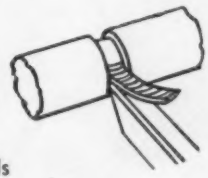
GIVE YOU LONGER BLADE LIFE

1. T-SHAPED BLADE . . .

provides liberal side clearance that eliminates excessive friction.

2. HOLLOW-GROUND TOP . . .

causes chips to collapse thus relieving friction against sidewall of cut.



3. COOLER OPERATION . . .

collapsed chips are drawn away from sidewalls permitting coolant to reach blade cutting edges.

In addition, you get blades that are *precision ground on all surfaces—complete blade interchangeability*—centrality of head to shank held to close tolerances—sharper cutting edges—resharpening on front face only—smoother cut-off surfaces.

The standard cut-off blade of all leading Machine Tool Manufacturers. Standard holders available for any machine using cut-off blades.

Made under license issued by John Milton Luers Patents, Inc.

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Bearings, Inc. service...this catalogue ...these plant men add up to big savings in bearing purchases!

Our Bearing Engineer was given permission by his customer to survey and compile a list of all equipment in their new plant. The proper bearings for each piece of this equipment were then catalogued. Shown above is the plant engineer, plant superintendent, and our sales engineer going over the results of his work. This catalogue shows application data on all machinery in the plant and lists the total number of bearings in the plant by size and bearing manufacturers' numbers.

It's now the "Bible" of the plant for bearing purchases and savings, since its completion, have been impressive!

Maintenance men now know the exact replacement bearing to requisition from stock. All bearings are correctly identified and are now ordered with the proper bearing numbers. Stocking several identical bearings for different machinery applications is *eliminated.*

We can perform this and many other services for *you*... For if it's a bearing problem, a call to our nearest branch will get you the answer!

Providing bearing service in the North ➤ **BEARINGS, INC.**

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It is beneficial for tapping steel and sand cast aluminum and is a "must" for cast iron and stainless steel.

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Bay State Tap & Die Company • Mansfield, Massachusetts

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FULMER HONING MACHINES

Amazingly fast, economical and precision-accurate honing of internal bores

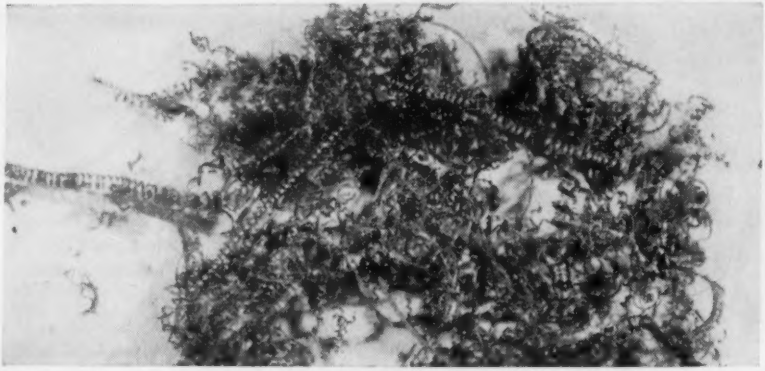
these are honing chips . . . some as long as SIX INCHES . . .

cut away from the internal bore of a steel hydraulic cylinder.

Highly successful precision-honing of cylinder blocks, connecting rods, blind end cylinders, hydraulic cylinders, valves, gears and other products. One continuous operation cuts away metal or other materials and then finishes accurate bores of geometric precision to tolerances as close as .0001(±) up to 1½ cubic inches per min.

WRITE FOR BULLETIN ON HONING AND FREE HONING COMPUTOR

C. ALLEN FULMER CO., 1233 1st National Bank Bldg., Cincinnati 2, Ohio



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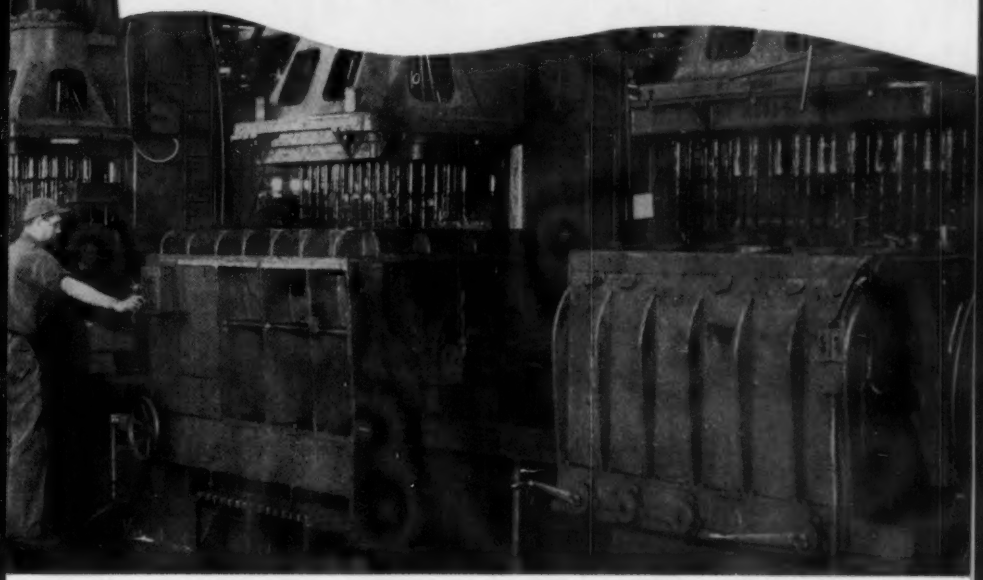
helps put quality in Caterpillar machines



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Caterpillar products are noted for their superb performance under severe conditions. The very name Caterpillar brings forth the image of power and quality.

Chicago-Latrobe is proud to be a regular supplier of drills and reamers to this quality conscious company. Throughout the Caterpillar plants, Chicago-Latrobe products are doing their part to help produce finer machines.

Chicago-Latrobe drills and reamers will do better work in your plant, too. Use them regularly. And take advantage of the free counsel of a Chicago-Latrobe Service-Engineer. His specialized skill may save you time and money.

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High Speed and Carbide Drills

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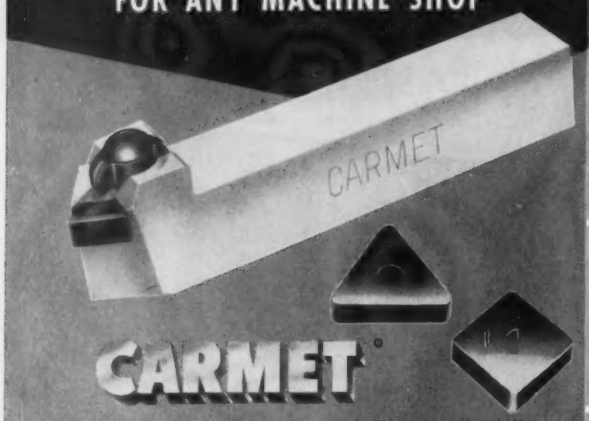
MONEY-SAVING COMBINATION FOR ANY MACHINE SHOP



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TOOL HOLDERS AND INDEXABLE INSERTS

To help you get every advantage from carbide cutting tools—high production, operating efficiency and economy—Carmet offers a full line of improved-design tool holders—*over* 115 styles and sizes to choose from in *both* positive and negative rake.

And Carmet Indexable inserts are available in more than 20 styles and sizes and in six different carbide grades—each insert permanently marked for positive grade identification—to give you *top* cutting performance.

Carmet tool holders and Indexable inserts make machining with carbides practical for any size plant. Match a Carmet tool to your requirements—or let Carmet give you engineering assistance in setting up a complete tooling program—and watch your production climb as costs go down. Inquire today.

• *Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Mich.*

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Expanded to 16 pages, this latest edition contains specifications of Carmet tool holders and Indexable inserts, replacement parts for tool holders, and information on choosing the proper carbide grade for the job.

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MATCH THE TOOL TO THE JOB

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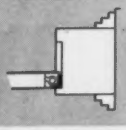
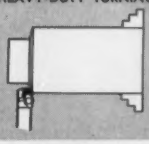


STYLE **SBTR** HEAVY-DUTY TURNING



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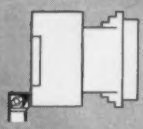

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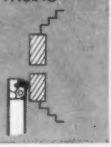
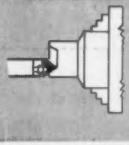
STYLE **SFTR** FACING



STYLE **SET** CHAMFERING

STYLE **TDTR** CHAMFERING



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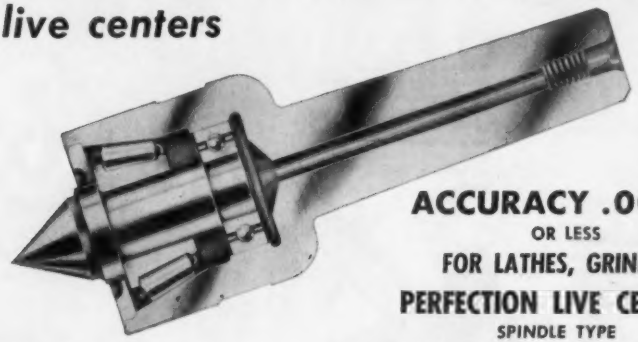

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SPINDLE TYPE
*GUARANTEED 2000 HOURS OR 1 YEAR

SIMPLE DESIGN:
Only six parts. One-piece main body serves as cup for roller bearing on which spindle turns. Allows much greater capacity bearing in same size body.

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End thrust from work keeps tapered roller bearing perfectly seated—bearing cone and inner race of ball bearing are pressed on spindle; outer race is a light press fit into main body.

ABSOLUTE CONCENTRICITY AND ALIGNMENT FOR BEARINGS:
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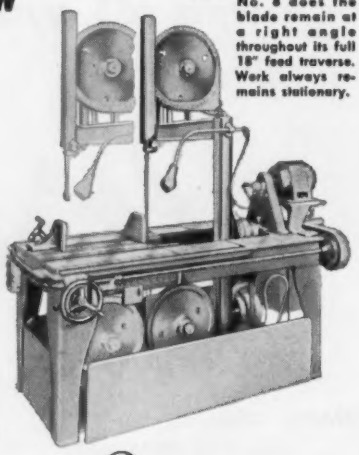
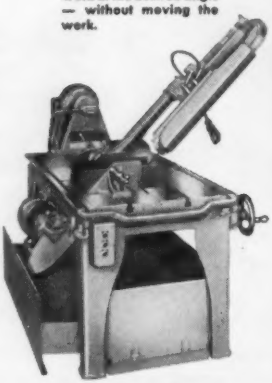
Never Confuse the No. 8 MARVEL with an ordinary Band Saw

...only the MARVEL is Universal

Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.



Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.



Only a No. 8 MARVEL can do all of these things: Snip-off a ½" rod or cut-off an 18" x 18" cross section.

Rough to Size and Shape

Miter

Index

cut off and shape Structural Beams

Slotting

Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.

"Rough Machine" to size and shape with minimun chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

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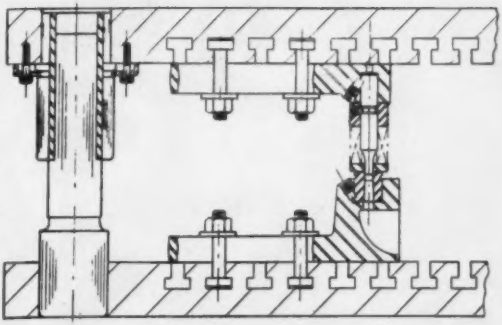
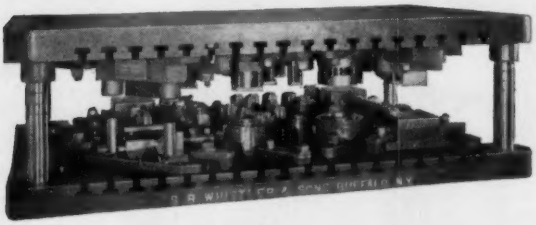
by WHISTLER

• Operate like a single purpose die • Easy to set-up and make changes • Interchangeable and re-usable parts always ready for a new job • Reduce die costs to a new low • Pierce holes in any desired arrangement of shapes and sizes • Precision piercing of materials to ¼" thick steel.



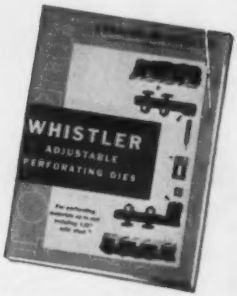


Above: Sectional drawing of a Whistler adjustable punch and die unit assembled in T-slot die set.

At the left: A completely assembled Whistler adjustable die ready for the press.

YOU NEED THIS CATALOG

to see for yourself in dollars and cents what this adjustable die making method can do for your plant. Send for it right now...without obligation.



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ADJUSTABLE, MAGNETIC and CUSTOM DIES FOR ALL INDUSTRY

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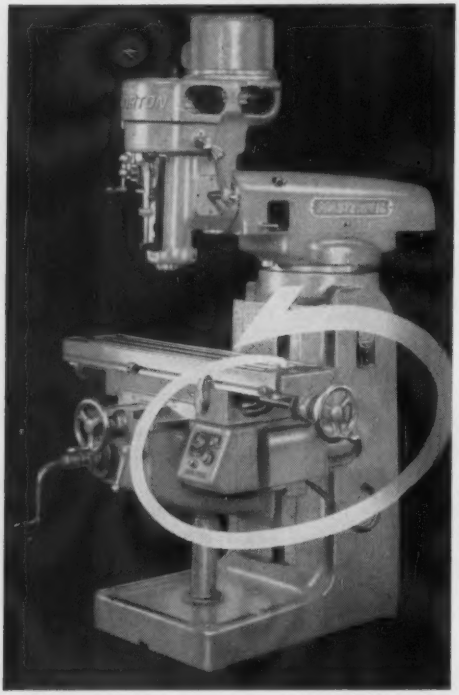

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It "feels" as it feeds

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—PLUS THE SMOOTHEST OPERATION IN DRILL HISTORY!

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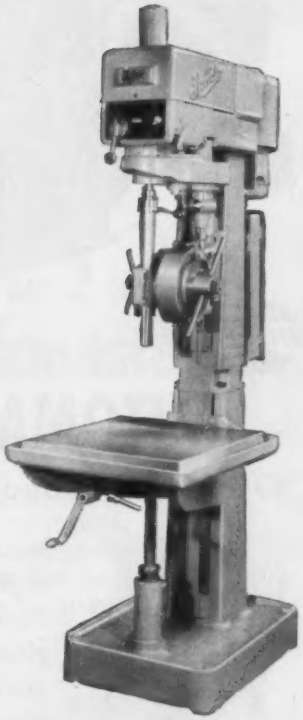
But you have to operate an "RMPster" to see why it's literally the finest value in vibration-free, variable-speed drilling available. Write for details on a demonstration at your "Buffalo" machine tool dealer's.



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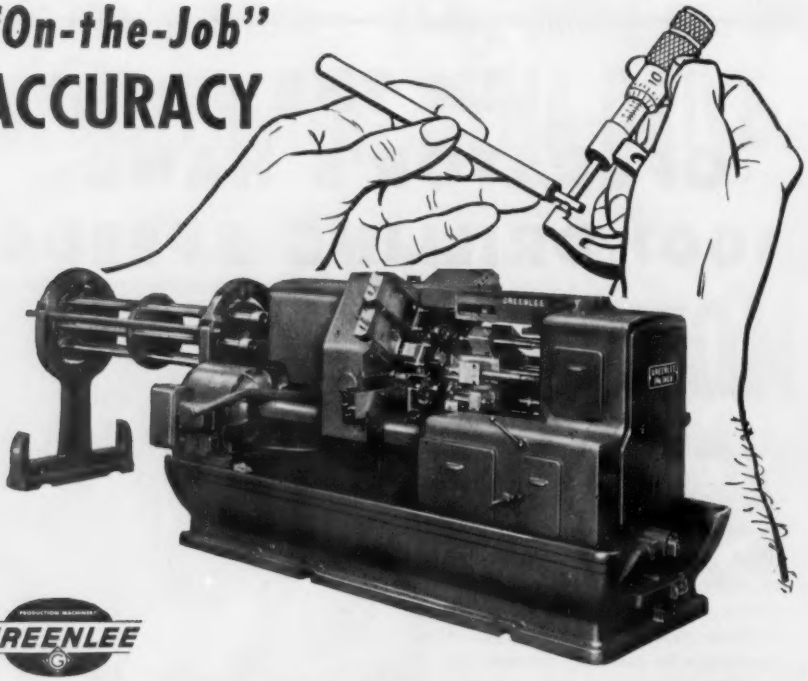

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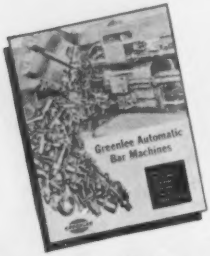
AUTOMATIC BAR MACHINES

Greater Dependability . . . Faster Production



Write today for Catalog A-405, first step on the way to more profitable production with Greenlee Automatic Bar Machines.

Modern production demands greater accuracy . . . at greater speeds. Greenlee Automatic Bar Machines maintain rigid production schedules and hold each piece within required tolerances. Let Greenlee engineers show you how Greenlee Automatics save time and money. It will pay you to investigate.

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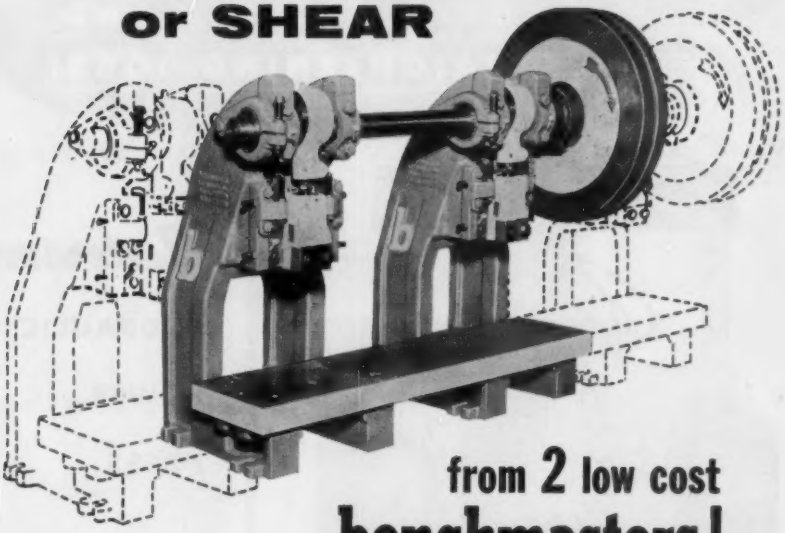

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Here's how to stretch equipment dollars to their utmost! For light press brake or shearing jobs, get a MULTIPLE RAM BENCHMASTER!

Custom sizes are possible simply by increasing ram-to-ram spacing and bolster length. Shear blade or forming bar is bolted to rams to perform your job. Available in 2, 5, 8 and 10-ton capacities, OBI, deep throat or fixed bed gap-type frames—plain or back geared. Write for circular and outline your requirements for a quotation!

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YOUR CHECKING AND STRAIGHTENING JOBS!

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Built with stationary or traveling ram . . . so sensitive a shaft may be straightened to within .001". Straightens and checks in the same position. Flexible, accurate control valve operated by a hand lever. Manufacturers with straightening, checking, and truing operations that require speed and accuracy find Anderson Power Presses to be the answer to their problems.

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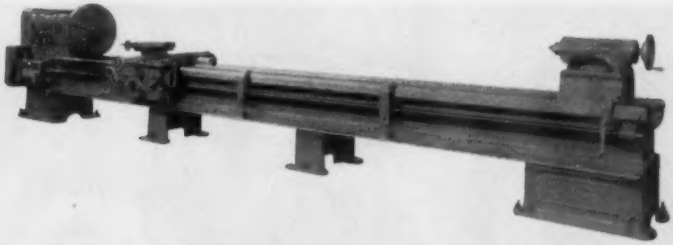
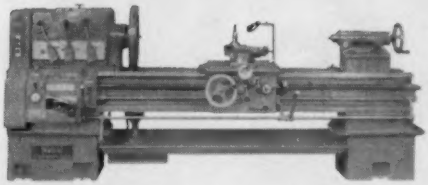
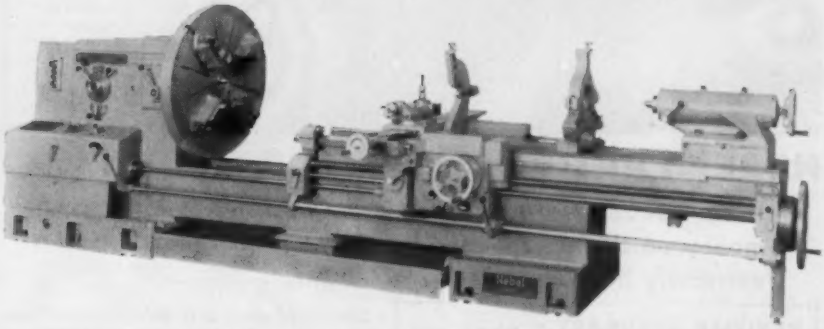


need a 40" lathe? what's the cost?



use a 20" lathe, too? what'll you pay?



buy this lathe and get the capacity of <u>both</u> at less than you pay for a 25" heavy duty!

Do you turn a variety of chucking and between-centers work? Then the Nebel XB 20"/40" heavy duty extension bed gap is your best lathe investment. Because it has the capacity of two ordinary lathes. Yet occupies the floor space of but one machine . . . and calls for only one investment.

Other double-duty Nebel extension bed gap lathes: G 28"/50" heavy duty and AG 20"/40" medium duty. Nebel also manufactures removable block gap and standard lathes. Send for descriptive bulletins. Nebel Lathe Div., Nebel Machine Tool Corp., 3409-A Central Parkway, Cincinnati 25, Ohio.

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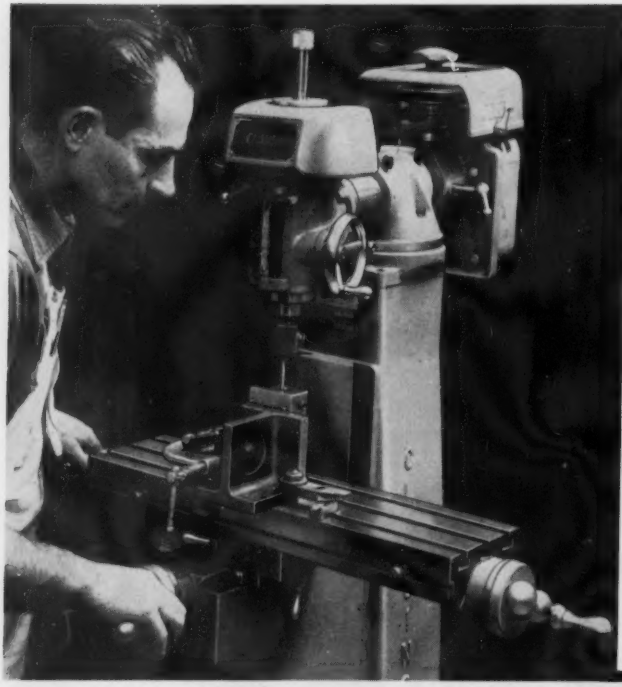
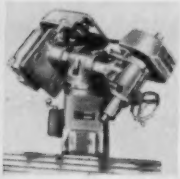


The high precision spindle and drive have 7 ball bearings . . . hardened spindle. Ground and hard chrome plated quill has full length bearing in head.



The spindle head can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to machine at all angles with one set-up.

HERE'S PROOF OF PERFORMANCE . . .

"The Clausing Vertical Miller is the best machine for the money on the market today! It is most versatile . . . and extremely accurate". — F. L. BALLENTINE, EMPIRE TOOL ENGINEERING COMPANY, INC.

VERIFIED ACCURACY — Before it leaves the factory each CLAUSING Mill must pass rigid tolerance tests such as:

1. Top of table perpendicular to column ways within .0005" in 6" travel.
2. T-slots square with cross slide dovetails within .0005".
3. Table, parallel to turret within .001".
4. Spindle square with table, front to rear, within .001" T.I.R. in 5" circle.
5. Spindle taper (internal) run out within .0002" at spindle nose.
6. Table T-slots parallel to table dovetail ways within .0005" in 8" longitudinal travel.

This report is typical of the experience of users everywhere. The CLAUSING VERTICAL MILLER is a precision machine tool designed for operations where "extremely accurate" machining is required. And, it is an outstanding producer, "most versatile, easiest to set up, get around and operate of *any* miller at or near its low price." Only $850 f.o.b. factory.

MILLS, DRILLS, BORES, REAMS, SHAPES AT ALL ANGLES . . . WITH ONE WORK SET-UP!

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A typical job at Westlof Tool & Die Co. — die tryout on progressive tooling. The press is also used for die tryout on Transmat type tooling.

Die tryout for a tool and die shop is probably one of the severest tests of the versatility of a press. At Westlof Tool & Die Co., Detroit, Michigan, a 300 ton Verson double crank, straight side press is used for this purpose.

The press itself incorporates several features which are examples of the versatility Verson engineering can provide: The ram is equipped with three triple bank cushions adjustable right or left to 7" centers. The bed has two large cushions, one right, one left. All cushions are independently controlled. The press is equipped for application of coil feeding equipment should it become necessary. Press speed is variable from 15 to 30 strokes per minute. Power adjustment of the slide is 15".

If your requirements call for great versatility, bring your problem to Verson. For specific recommendations, just send an outline of your needs.

A Verson Press for every job from 60 tons up.

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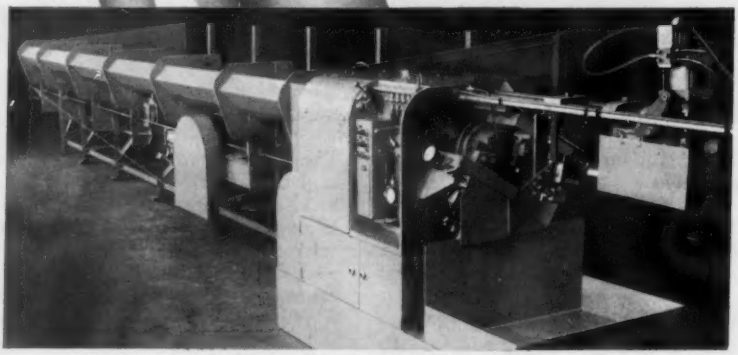
Automatic operation—from loading to final cut-off. Handles tubing up to 8" O.D. Very fast. With special tools, parts being cut off may be formed, grooved, flanged or chamfered in a single operation—at a high rate of speed.



WRITE for CATALOG

New catalog describes all models—gives production figures. Mailed on request.

MODERN MACHINE TOOL CO.

2005 Losey, Jackson, Michigan

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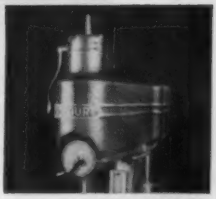
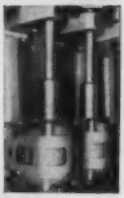
FOOTBURT



No. 2 Machine with Back Gear • 12" Overhang • 5/8" Drilling Capacity in Steel • Optional Speed Ranges • 185 to 2300 RPM • 280 to 3450 RPM • Vertical Motor Drive with Standard Single Speed Motor • Power Feed Assembly • Tapping Attachment • Coolant Outfit.



Sensitive drilling machines

A FULL RANGE DRILLING MACHINE ENGINEERED FOR PRODUCTION

Built carefully to provide the required accuracy for fine tool room work, Footburt Sensitives are designed with the weight and stability to maintain close tolerances on day after day production work. The correct speed for a wide range of drilling, reaming, and counter-boring operations is instantly available. Write for full information on this great line of Sensitive Drilling Machines. Built in 1,2,3,4,6 Spindle Models.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: 24632 Northwestern Highway, Detroit 35, Mich.

ENGINEERED FOR PRODUCTION • *Write for Circular #508A.*

FOOTBURT

MACHINE TOOLS

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A NEW LINE OF DAKE *air hydraulic* PRESSES

FOUR NEW MODELS

25 TONS provides easy operation, low cost, and speed for general pressing and production work.

50 TONS for assembling, straightening, bending in minimum time.

75 TONS for handling heavy-duty press jobs quickly and easily. Ideal for machine shops, tool and die shops.

150 TONS for extra-heavy press work in heavy industry. This press is recommended for construction work, fabrication, and repair work requiring extra-heavy pressures.

CHECK THESE IMPORTANT DAKE FEATURES

√ **Rapid Ram Approach**—automatically changes to power stroke when it contacts the work.

√ **Modern Design**—all of the operating controls are at convenient working height.

√ **Movable Workhead**—self-contained, easy to center over work. Workhead can be purchased separately.

√ **Extra Long Stroke**—handles long pressing jobs more easily.

DAKE CORPORATION, 612 Seventh Street, Grand Haven, Michigan

DAKE PRESSES

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CLEEREMAN

"Series A" *Automatic* Drilling and Tapping Machines

producing faster... better... easier... from coast to coast!

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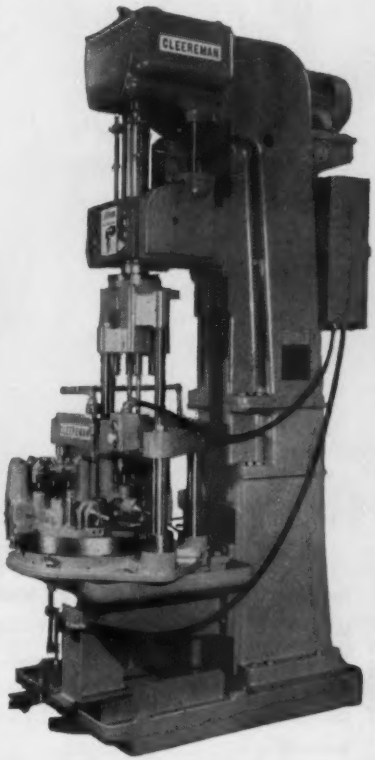

These are a few of the Cleereman "Series A" users who find this "box cycle" automatic Drilling and Tapping Machine the answer to their problems.

Drilling and tapping a hole "at the touch of a button" produces faster, easier and at highest profits. Operators are relieved of handling cumbersome controls. Operator morale is boosted and operator fatigue reduced.

Join the rapidly increasing Cleereman "Series A" users list. This fast set-up production-type drilling and tapping machine has a place in your plant. Don't delay increasing your production efficiency. *Wire, write* or *phone* about your jobs right now.

BRYANT
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CLEEREMAN MACHINE TOOL CORP.
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MAIL FREE Tool Bit COMPARISON CHART, CATALOG and PRICE LIST S

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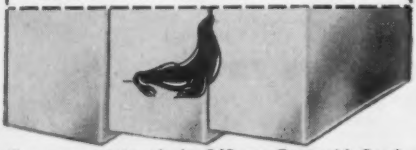

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Meetings

Important Meeting Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

January 27-30 • Plant Maintenance and Engineering Show, International Amphitheatre, Chicago. Information: Clapp and Poliak, Inc., 341 Madison Ave., New York 17, New York.

March 9-11 • American Machine Tool Distributors' Association, Spring Meeting, The Roosevelt, New Orleans, La. Association headquarters: 1900 Arch St., Philadelphia 6, Pennsylvania.

March 17-18 • Steel Founders' Society of America, Annual Meeting, Drake Hotel, Chicago. Society headquarters: 606 Terminal Tower, Cleveland 13, Ohio.

April 14-18 • American Welding Society, Annual Meeting and Welding Show, Hotel Statler and Kiel Auditorium, St. Louis. Society headquarters: 33 W. 39th St., New York 18, New York.

April 27-May 2 • National Association of Architectural Metal Manufacturers, Annual Convention, Shamrock Hilton, Houston, Texas. Association headquarters: 228 N. LaSalle St., Chicago 1, Illinois.

May 1-8 • American Society of Tool Engineers, Annual Meeting and Tool Show, Philadelphia Convention Center, Philadelphia. Society headquarters: 10700 Puritan Ave., Detroit 38, Michigan.

MAKE GAGES LAST LONGER

DON'T

offered by Size Control Company as a service for our thousands of satisfied customers and friends.

- ✖Don't Force a gage into or over the part being checked.
- ✖Don't lay gages on benches, machines or dirty surfaces.
- ✖Don't clean gages in water, soluble solutions, kerosene or carbon tetrachloride — all cause rusting.
- ✖Don't spin parts on or off gages. This induces rapid wear.
- ✖Don't lay gages in the sunshine — expansion will cause errors.
- ✖Don't use gages that fit loosely. Know the "feel" of proper gaging.
- ✖Don't use gages that show visible burrs, nicks or other irregularities, and REMEMBER — reversing the plugs, end for end, and careful removal of a small segment of the leading edge when it becomes worn will provide up to six times longer useful life!

We'd like to discuss your gage needs and have your gage orders. Our engineering representatives are located in all principal cities. Write or telephone us

8¼ x 11 reprints of this ad in three colors on heavy stock are available at no charge for posting in your factory.

DO

- ✔Learn how to properly hold and use your gages. Fit must be snug and smooth. Make wooden, felt covered gage racks. Oil the felt surface. This helps to keep your gages clean.
- ✔Roll or twist the gages into the work slowly to get the proper feel.
- ✔Check every gage against the master gages before using, at least once on every shift and before returning to the tool crib.
- ✔*Include gaging expense as part of manufacturing budget. Quality product companies now do this.*

... AND insist on *all* of these quality features when you buy new gages:

- *Reversible Plugs* . . . enable you to cut off worn tips at each end — use new section exposed for six to eight times more wear life.
- *Entire Plug Surface Usable* — straight untapered pieces provide uniform gaging surface over entire length — finish to 1.5 microinches RMS or less for maximum amount of wear life.
- *Pin-Vise Aluminum Handle* — positive locking; plugs can't slip. Easily loosened for replacing or reversing plug. Plug length adjustable for different hole depths.
- *Easy Recognition* — GO in green finish; NO GO red.
- *Special Hardening* — plugs hardened throughout . . . enables you to grind down to smaller size . . . gives greater economy.

SIZE CONTROL COMPANY

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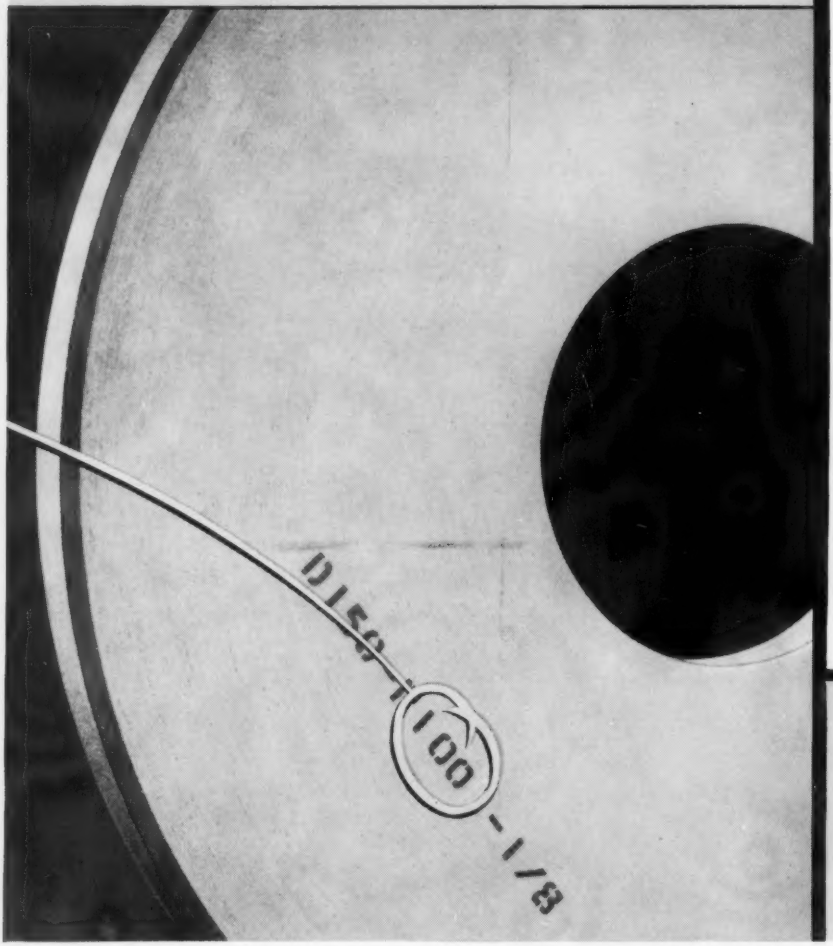
STANDARD TRANSFORMER CO., WARREN, OHIO

ON NORTON DIAMOND WHEELS
...THIS MARK IS

Your CERTIFIED Buying Guide



On this Norton diamond wheel we have highlighted the mark indicating diamond concentration — in this case, 100.

What is the exact meaning of the Norton 100 mark?

It means that each Norton 100 concentration diamond wheel contains an amount of diamond in carats calculated to a formula of 72 carats per cubic inch. Wheels of 75, 50 and 25 concentration of diamond contain 75%, 50% and 25% of this 100 concentration standard, respectively.

The finished wheel contains the calculated number of carats of diamond except for the slight loss resulting from truing the diamond section to place the wheel in proper truth and condition for grinding.

With each wheel you get a certificate assuring the complete dependability of its concentration mark, signed by the President of this Company.

The Norton certified mark is your safest possible buying guide. It assures the top performance and long wheel life that you're paying for.

And remember:

Besides duplicating wheel specifications with constantly controlled accuracy, Norton was first to introduce all three types of diamond wheels — metal, resinoid and vitrified bonded . . . does all its own sizing, grading and laboratory checking of diamond bort . . . brings you a complete line, covering every diamond wheel application . . . gives you fast service from full stocks.

See Your Norton Distributor

for the diamond wheels you need. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

W-1838

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Making better products... to make your products better

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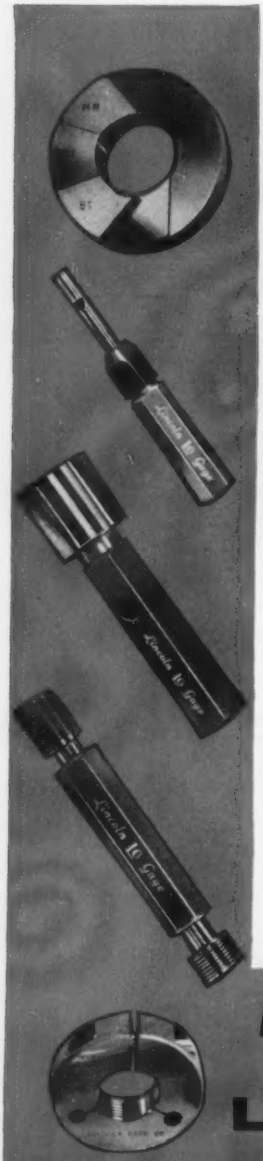

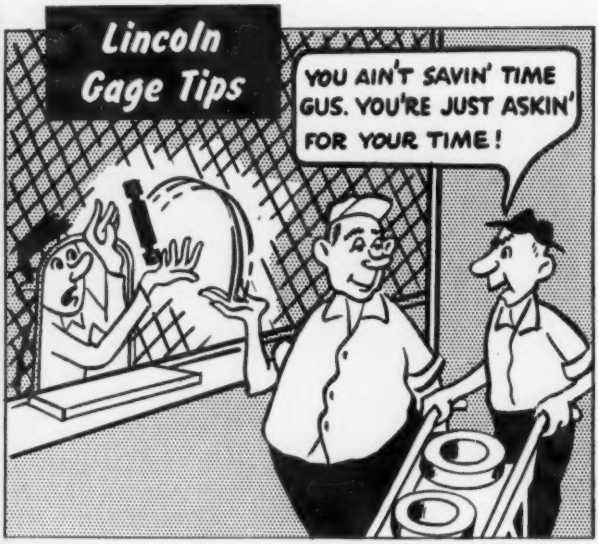

HANDLE A THREAD GAGE WITH CARE. Try not to bang it against another hard object or drop it. Such acts could nick the thread crest thus making the gage useless.

Some gages can be repaired only by grinding them under-size, then bringing them up to size by Lincaloy chrome plating. A Lincaloy gage will give up to 400% more gage life and be extremely resistant to abrasion on production parts. Send in your worn out gages. They will be returned better than new, at a much lower cost!

DEPENDABLE GAGES
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Teletype No. Roseville 834.

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modern machine shop

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modern machine shop
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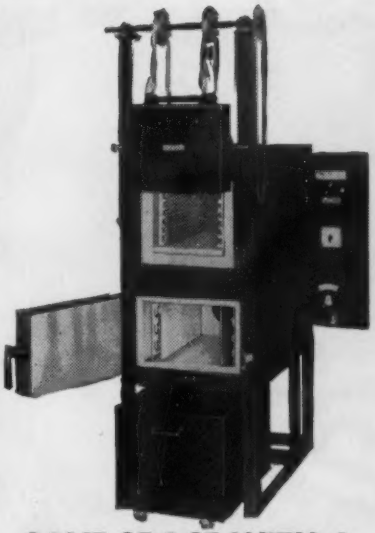

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SERIES 8055
COMBINATION MODEL

Two independent furnaces (hardening and drawing) in the same floor space one requires. Complete with independent controls. Hardening furnace available in both a 2000° and a 2300° F. range.

Drawing furnace has a maximum of 800° F.* Quench tank included with the exception of the largest standard model.

Chamber Size H. W. L.	Prices 2000° F.	2300° F.
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9" x 9" x 18"	1325.00	1450.00
12" x 12" x 24"	1850.00	1950.00
18" x 18" x 36"	2750.00	2875.00

* Also available up to 1250° F.

WRITE FOR FREE LITERATURE, SPECIFICATIONS and price list of Lucifer Furnaces in wide range of sizes —top loading and side loading types. Engineering advice without obligation. Write, wire or phone today.

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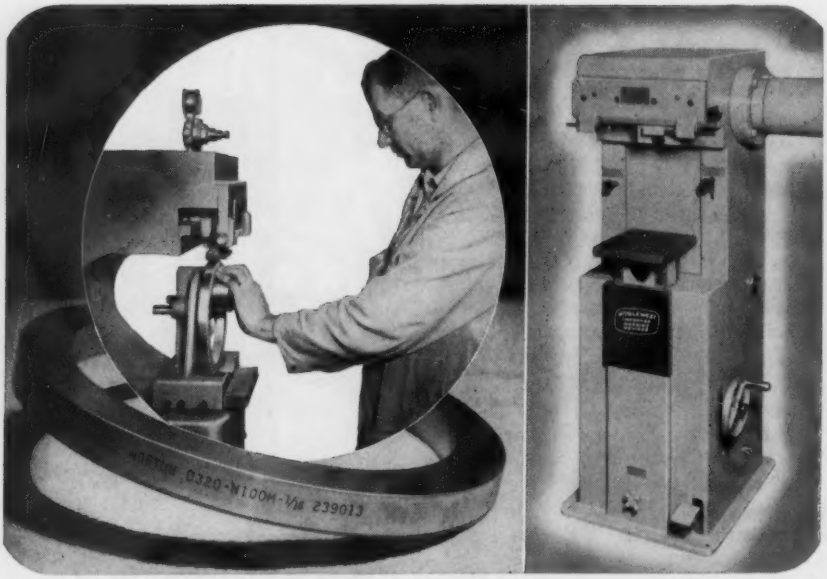

New Heavy Duty ROLL-O-MARK

Multi-Purpose Metal Marking Machine Features—

- ***Extra large work capacity***
- ***Greater versatility***
- ***Marks, numbers, graduates, embosses***
- ***Low operating cost***

Visit the Noblewest MARK-O-RAMA Booth 837 at the Tool Engineers Show — May 1 - 8

Marking the surface of large diameter rings (shown above) is just one of many applications that are being done faster, better and at lower cost with this heavy duty all-pneumatic Roll-O-Mark. It is one of the famous Noblewest Series 50 general purpose marking machines available in a large range of models from light to heavy duty. Can be tooled for marking round or flat surfaces, precision graduating, serial numbering, knurling, and embossing. Noblewest designs and makes the machines, marking dies, and work-holding fixtures for doing the complete job. Noblewest Roll-Marking is *permanent, indented* marking—*good for the life of your product.* For literature on Series 50, write Noble & Westbrook Manufacturing Company, 25 Westbrook Street, East Hartford 8, Connecticut.

MARK IT BEST WITH

NOBLEWEST IMPROVED MARKING DEVICES

NOBLEWEST

ORIGINATORS OF THE ROLL MARKING PROCESS

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Tough 2½" diameter mandrel at Rc 44 on 1150 ton brass extrusion press. Scovill Manufacturing Co.

Mandrel of HALCOMB 218 retains toughness and hardness at hot work temperatures...

This mandrel is made of Halcomb 218—a tough, air-hardening hot work steel. Halcomb 218 is suitable for tools like this which require a higher degree of toughness at moderately elevated temperatures than is obtainable with the tungsten types of hot work steels. And Halcomb 218 *retains both* its hardness and strength at these temperatures.

For example, at a hardness of Rc 44, Halcomb 218's Charpy Impact Strength is 33 ft-lbs at 500F. And it will retain this hardness after 1 hour, after 10 hours and even after 100 hours at temperatures up to 900F.

Properties like these cut tooling costs. The mandrel shown above is good for 1200 pushes, for example, and even then all it needs, usually, is repolishing before being used again.

Halcomb 218 is particularly useful for all hot work operations on which drastic coolants are used. It even resists breaking very successfully when water cooled in operation. If these sound like advantages you can use, call your local Crucible representative for more complete data. *Crucible Steel Company of America, Chamber of Commerce Bldg., 7th Ave. and Smithfield St., Pittsburgh 30, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Canadian Distributor — Railway & Power Engineering Corp., Ltd.

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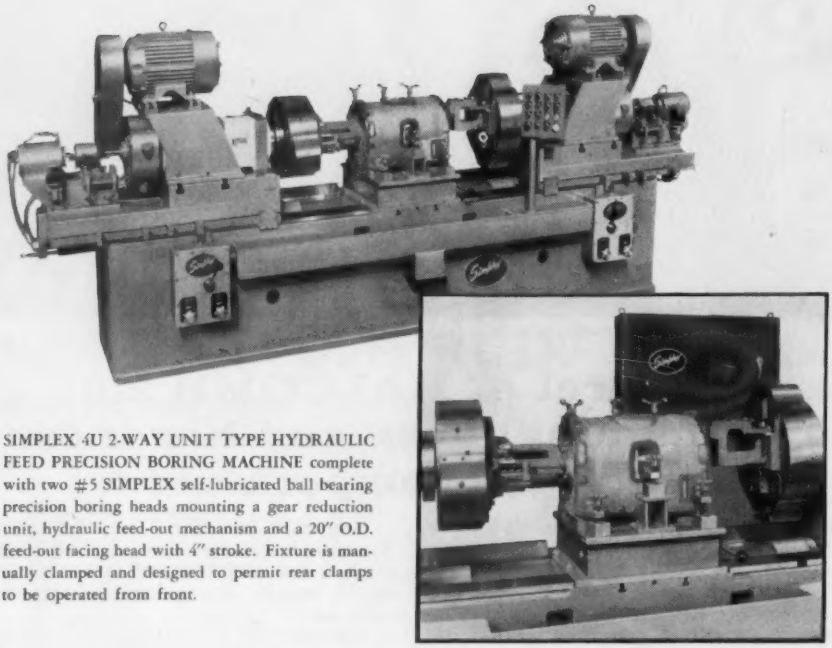
Simplex

PRECISION BORING MACHINES



SIMPLEX 4U 2-WAY UNIT TYPE HYDRAULIC FEED PRECISION BORING MACHINE complete with two #5 SIMPLEX self-lubricated ball bearing precision boring heads mounting a gear reduction unit, hydraulic feed-out mechanism and a 20" O.D. feed-out facing head with 4" stroke. Fixture is manually clamped and designed to permit rear clamps to be operated from front.

25TH Anniversary

1932 — 1957

SIMPLEX MACHINE TOOL CORPORATION

4528 WEST MITCHELL STREET

MILWAUKEE, WISCONSIN

PRECISION BORING MACHINES • PLANER TYPE MILLING MACHINES
SPECIAL DRILLING, TAPPING AND BORING MACHINES

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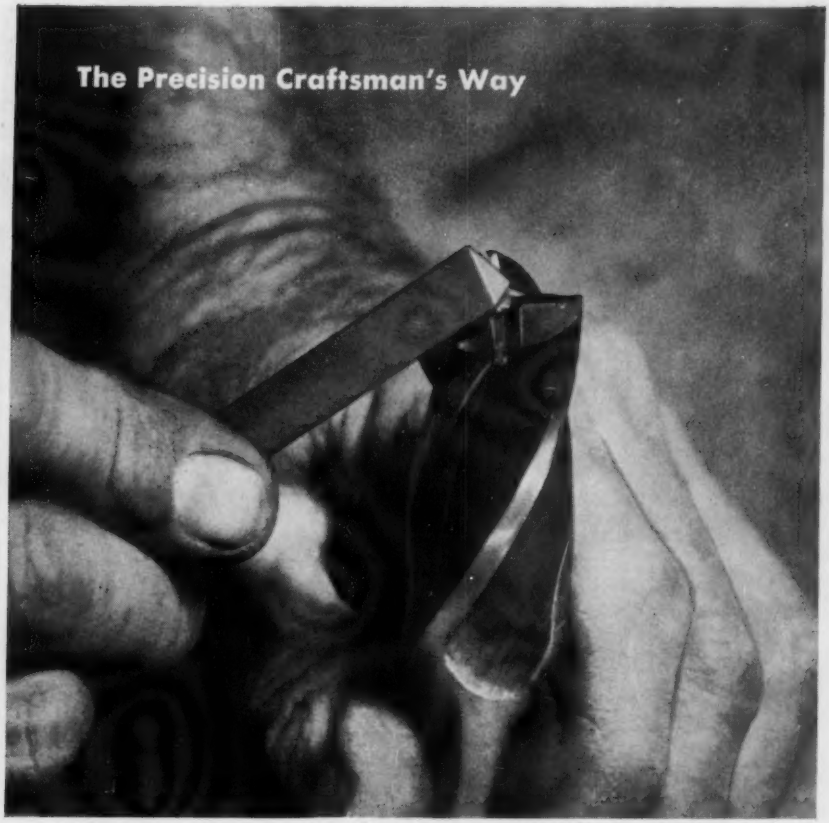

Honing a spiral end mill with a medium India Triangular File for the finest uniform finish.

FREE: Send for the Hand Stoning Handbook —helpful hints on sharpening, radiusing, chamfering, deburring, and fitting delicate parts. And remember: India and Hard Arkansas oilstone files hold their shape longer ... and *won't dull.* In 35 shapes ... 97 sizes ... for every job

BEHR-MANNING CO.

TROY, N. Y.

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BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes
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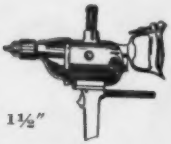
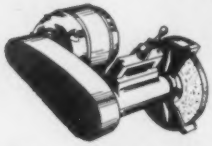
GENERAL PURPOSE

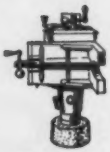


¼" TO 1½"

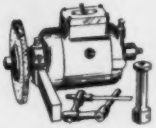
United States Electrical Tools



PRECISION LATHE



VERTICAL SPINDLE



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Electrically and mechanically correct. All rotating parts and spindles are precision-balanced dynamically by latest electronic equipment.

Performance — plus remarkable savings in time and costs — as well as minimum maintenance — these are features to assure your satisfaction.
Precision-engineered and crafted for maximum endurance under exacting conditions . . . tools to speed production or for plant purposes.

Attractively priced.

WRITE FOR CATALOG

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

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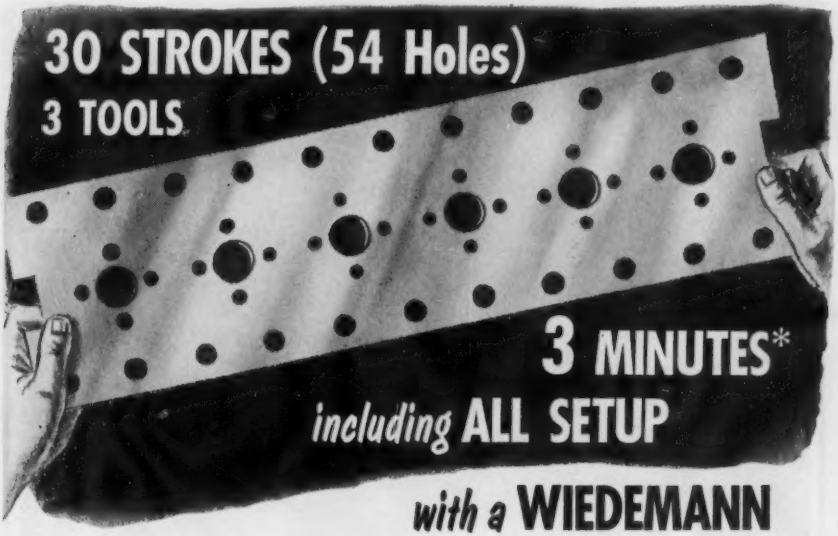
30 STROKES (54 Holes)
3 TOOLS



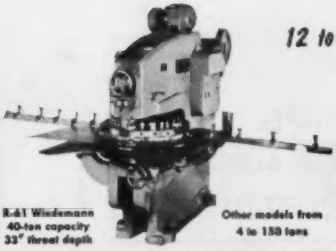
3 MINUTES* *including* ALL SETUP
with a WIEDEMANN

How long would it take you to produce this job from scratch? . . . 30 minutes? . . . 2 hours? . . . 4 hours?

Using a Wiedemann Turret Punch Press, this job was completed in 185 SECONDS (additional parts only 65 seconds each). Here is production speed that is almost beyond belief—unless you have seen a Wiedemann in action or have had a time study made of your work.

The unmatched speed and flexibility of a Wiedemann Turret Punch Press can cut your short to medium run piercing costs 60% to 90%. To get the facts, send drawings of your work for time study, or write for Bulletin 301 today.

** Pierced on an R-61 Wiedemann with drop latch gauge (illustrated). Time includes rotating turrets to required punch and die stations, and setting the quick-acting gauge—simple mechanical functions which eliminate all tool setup and layout.*



R-61 Wiedemann 40-ton capacity 33" throat depth

Other models from 4 to 150 tons

12 to 32 Punches and Dies Ready for Use

WIEDEMANN MACHINE COMPANY
TURRET PUNCH PRESSES

4219 WISSAHICKON AVE., PHILADELPHIA 32, PA.

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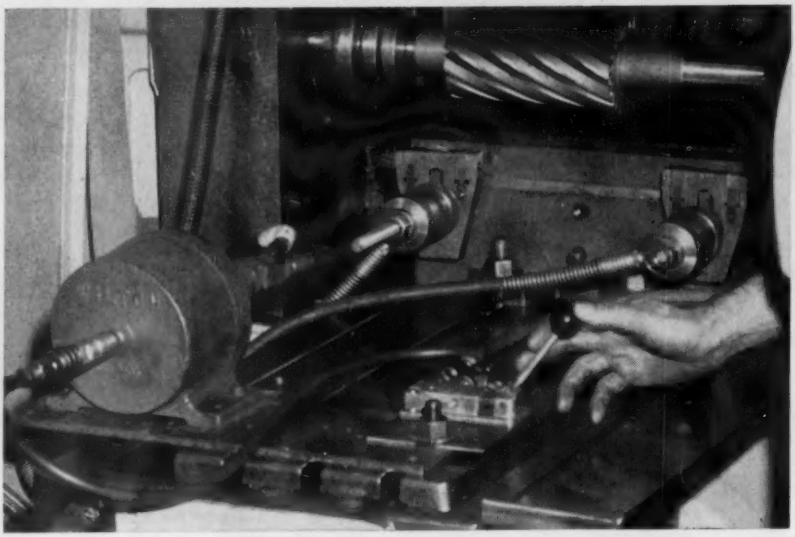

IBM AUTOMATES WITH POWRLOCK!

In the International Business Machines Corp. Endicott, N. Y. plant, PowRlock air hydraulic setup clamps have been used to automate this milling fixture. A touch of the control now opens and closes the same fixture which previously was tightened and loosened by using a socket wrench on two manual clamps. The results are much faster loading, less operator fatigue, and elimination of waste labor. PowRlock setup clamps are the first step to inexpensive automation. They install easily on most existing fixures, lock instantly at 1 to 16 different locations, and completely eliminate manual clamping. Find out how they can make men and machines more productive in your plant!

MMS-18

Attach this ad to your letterhead for free demonstration or literature!

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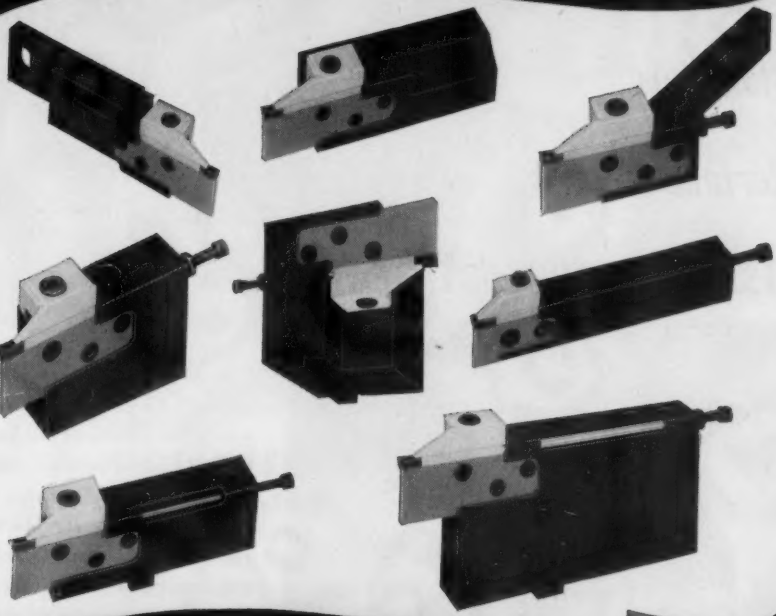
NOW...A CUT-OFF TOOL for EVERY Application . . .



The complete line of P.D.Q. (Portage Double Quick) Manchester cut-off tools includes tooling for all makes of Turret Lathes, Engine Lathes, Production Lathes, Automatics and Cutting-Off Machines.

This wide selection of carbide tools, designed specifically for each type of machine, offers real speed and economy in parting and grooving problems. Write for the illustrated catalog covering all the available standard types. Specials available on request.

PDQ

PORTAGE Double-Quick, Inc.

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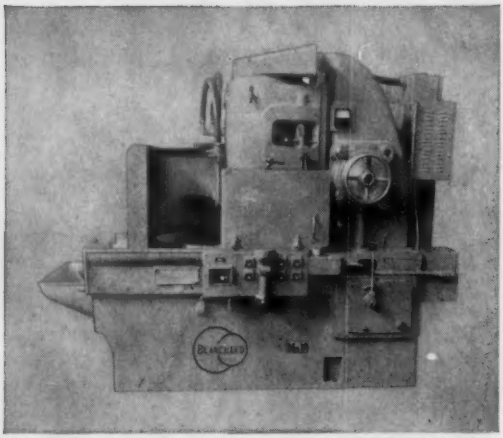
For best results from your Blanchard Surface Grinder



Use Blanchard Wheels!

Blanchard specializes in the manufacture of segments and cylinder wheels for Blanchard and other Vertical Spindle Surface Grinders. If you have a difficult grinding job, whatever the material may be, or if you are not satisfied with the results you are now getting, let us help you.

Blanchard wheels are the quality wheels for Blanchard Grinding. Use them to get maximum performance *from your Blanchard!*

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Please send me a free copy of "The Art of Blanchard Surface Grinding" (3rd Edition).

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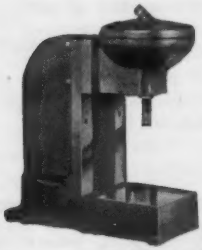
HIGH SPEED • POWERFUL GRIP

New, improved model speeds up all repeat operations—*milling, drilling, tapping, punching, bending, riveting.* Both hands left free to produce more! Light squeeze to 2250 pounds pressure! Extra thick jaws for attaching jigs. Jaws open to 3 inches; 1/16" to 5/8" maximum travel. With foot control and air hose. **$44.00**



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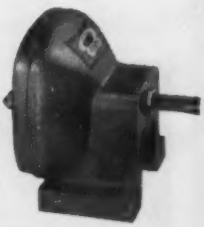
Does the work of expensive presses! 5-inch throat; Ram 0 to 5"; stroke 3/8"; table 5" x 5". Operated by foot or our fingertip controls. $85.00



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Mounts in any position. Compact, extremely sturdy. Exerts gentle pressure to one ton thrust. 6½" high, 5¾" wide. $35.00

Order from Your Supplier or Write for Air Tool Catalog

W. R. BROWN CORP., 2669 N. NORMANDY AVE., CHICAGO 35, ILL.

AIR REGULATORS • AIR VALVES • AIR FILTERS • PAINT SPRAYERS • AIR COMPRESSORS

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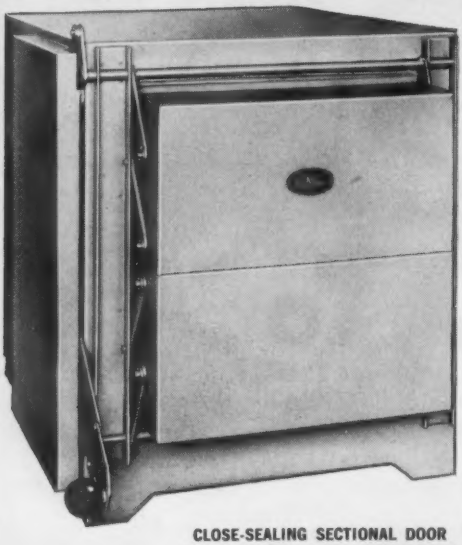
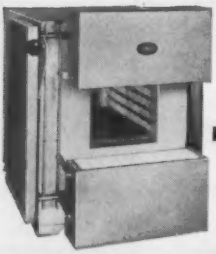
NEW *big,* bench type electric furnace for heavy production heat-treating, including high-speed steels

TEMCO

TYPE 1800 with temperatures to 2000° and 2300° F.



CLOSE-SEALING SECTIONAL DOOR WITH PATENTED LEVER SUSPENSION



Lower section alone can be partially or fully opened (or both sections can be fully opened) to give you limited or full access as desired, conserve heat, minimize temperature drop and recovery time. Smooth, effortless operation.

Here's the all-new TEMCO furnace designed specifically to meet many of today's industrial production heat-treating demands as well as expanded requirements for testing and analysis. **Higher temperature range** . . . continuous up to 2000° and 2300° F (1095° and 1260° C) . . . lets this unit handle most high-speed steels. **Larger chamber size** . . . 10" W, 9½" H, 22" D . . . means that you can now heat-treat more and bigger parts in a bench-type unit and free your larger equipment for other work. Also now makes it most economical and efficient for you to do your own heat-treating of materials which you may be "farming out." Take a close look at this new furnace . . . see how it can help speed production, cut your costs!

The new TEMCO Type 1800 Electric Furnace features heavy-duty, long-life heating elements which are easily replaceable . . . full 7½ inches of high-grade firebrick and backup insulation . . . reinforced welded steel construction . . . heat and corrosion-resistant mottled gray enamel finish. Available either with or without controls . . . choice of single or three-phase models with top temperatures of 2000° or 2300° F. $570 to $620 furnace only, without controls. Write for new TEMCO catalog and name of nearest dealer.

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New STARRETT Satin Chrome MASTER-VERNIER CALIPER

for faster, easier, error-proof reading with life-time accuracy

Truly a masterpiece of precision toolmaking, this new Starrett No. 123 MASTER-VERNIER Caliper delivers a lifetime of easier, faster measuring with accuracy that is almost completely error-proof.

Your nearby Industrial Supply Distributor will show you this new MASTER-VERNIER Caliper in 12 and 24-inch sizes . . . also many other new Starrett tools designed to make accuracy easy. Call him for quality products, dependable service. Or write for big, new Starrett Catalog No. 27 which shows the complete line. Address Dept. MD, The L. S. Starrett Company, Athol, Massachusetts, U. S. A.

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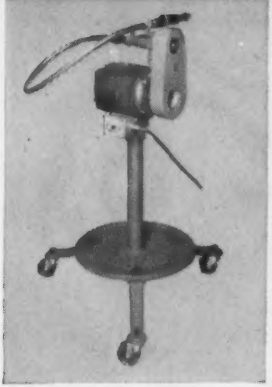
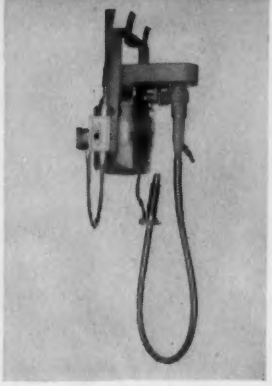
R. G. haskins Co.

FLEXIBLE SHAFT MACHINES





faster Haskins machines will speed production on a big variety of metal-working jobs with their continuous speed and unerring performance. And there's no need to worry about changing tools—it takes just seconds to switch to any one of the numerous metal-working attachments in the Haskins line. *Use Haskins equipment and eliminate interruptions.*

easier Haskins flexible shaft machines make the whole operation a simple matter. They're portable—ready to go to work in whatever spot you choose, even remote sections of your plant. Operators say Haskins machines are easy to use because they have to hold only the lightweight handpiece which permits greater accuracy for close, precision work. You should know about Haskins flexible shaft machines and accessories-*leaders in their field for over 30 years.*

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R. G. HASKINS Co.

2647 West Harrison Street Chicago 12, Illinois

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a PROCUNIER TAPPER pays for itself!

Built-in features and operating advantages increase production—reduce costs!

Any way you look at it—you save and gain with Procunier Tappers. It is an uncontested fact, when you use Procunier you are enjoying the advantages of the finest tapping heads. Countless reports indicate tremendous savings on taps, automatic production increases, drastic reduction in parts spoilage, less operator fatigue, fewer "down hours" and precision accuracy in threads and tapped holes. Taking these gains and savings into consideration you can quickly see why Procunier heads "pay for themselves in just a short time!"

Procunier heads offer high speed, quiet operation, a new, powerful drive—with finger tip pressure; economical lightness, "long life" ruggedness and an accuracy and dependability you can consistently count upon! And, there's a versatile model for practically every tapping operation.

Send for FREE Brochure

Find out how you, too, can benefit with Procunier. Get the full construction details—see the many unusual tapping applications — get the "inside story" on why Procunier has led the field for more than 30 years. Write today—now.

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Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

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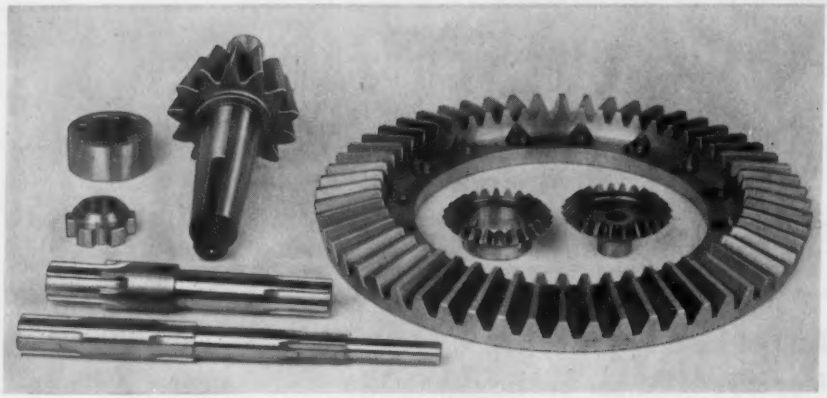

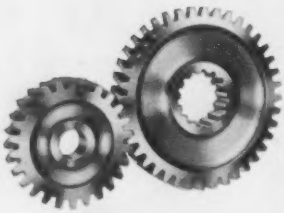

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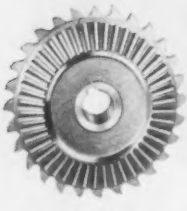
ADAMS GEARS

Seventy-five years of experience in meeting the requirements of industry, the constant improvement of facilities for precision manufacture, and exacting inspection and testing on modern equipment, have made us specialists in transforming your specifications into fine gears.

For details, write to The Adams Company, 1942 Cypress St., Dubuque, Iowa.



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1883 75 years of progress 1958

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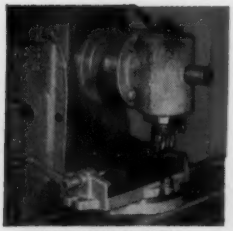
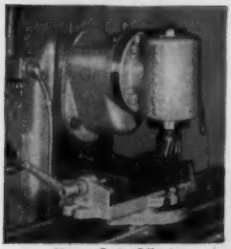


Heavy Duty Vertical Milling Attachment



Heavy Duty Offset Vertical Milling Attachment

Universal Milling Attachment

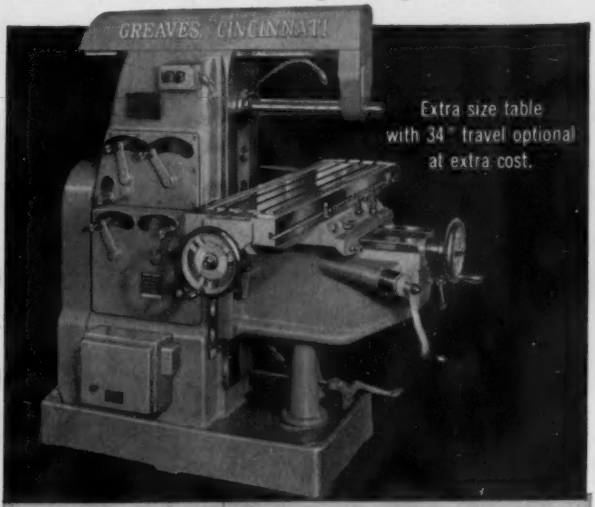
Toolmakers Overarm

Heavy duty attachments increase versatility of dependable, low-cost

GREAVES MILLS

"THE MOST MILL FOR THE LEAST MONEY"

A full line of attachments and accessories offer outstanding flexibility for all types of milling operations . . . with GREAVES MILLS. Make your own comparison of 22 specifications of Greaves and 7 other leading milling machines.



Extra size table with 34" travel optional at extra cost.

Send coupon for FREE Comparison Chart and detailed descriptive literature on easy-to-use attachments.

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Send Comparison Chart. I will make my own comparison of GREAVES MILLS with other makes.

Send information on Attachments and Accessories for GREAVES MILLS.

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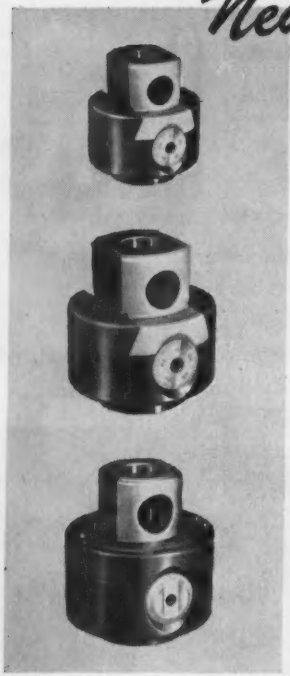


3 NEW BORING HEADS
WITH THESE OUTSTANDING FEATURES

Round-body design
Cross-hole for greater range
Short - compact construction
Sizes — #102 has 2" diameter
#103 has 3" diameter
Boring range — 1/16" to 8" and larger

NEW 3" DIAMETER MODEL #203
INCLUDES THESE ADDITIONAL FEATURES

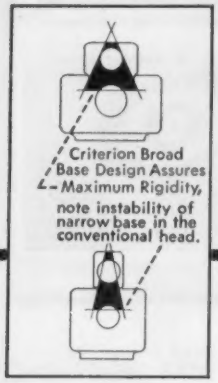
Protective cap houses all moving parts
Friction lock dial face permits return to zero setting.

THESE NEW HEADS TAKE ½" or ¾"
SHANK BORING TOOLS AND BORING BARS

RUST-RESISTING BLACK AND
SATIN-CHROME FINISH

Offset range — ½" in 2" dia. model
¾" in 3" dia. model
Complete line of high-speed and carbide boring tools to fit all Criterion Heads carried in stock.

CRITERION BORING HEADS are better because they combine utility with simplicity of design — see sketch to the right for one of many features.



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MACHINE WORKS
756 WEST SIXTEENTH STREET
COSTA MESA, CALIF.

Consult your Criterion Dealer or write for free literature.

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...attained with the New SIP HYDROPTIC 6A Jig Boring and Milling Machine

Due to unprecedented cutting ability . . . increased range and capacity . . . simplification of controls . . . and ease of operation, the HYDROPTIC 6A is unmatched in performance.

Up to **30% increase** in productivity has been realized with the AUTOMATIC COORDINATE REPEATING DEVICE DIR (optional equipment) which repeats successively the initial settings made during the machining of the first workpiece.

As with all SIP HYDROPTICS, *accuracy is based on* SIP *Precision* STANDARD SCALES.
For complete information, send for Catalog No. 1149.

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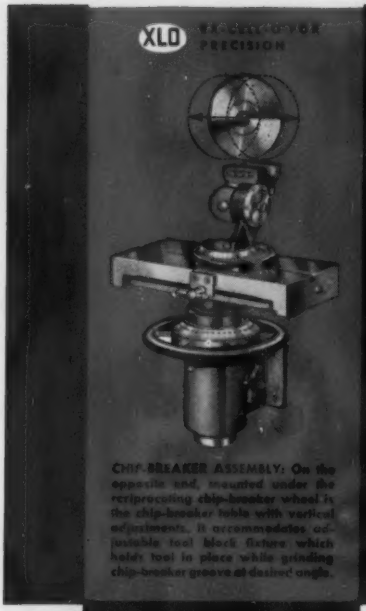

CHIP-BREAKER ASSEMBLY: On the opposite end, mounted under the reciprocating chip-breaker wheel is the chip-breaker table with vertical adjustments. It accommodates adjustable tool block fixture which holds tool in place while grinding chip-breaker groove at desired angle.

TWO MODELS AVAILABLE: Style 142 for conventional grinding with vitrified or diamond wheels; Style 264, equipped with metal-bonded diamond wheels, for *electrolytic* grinding.

new DUAL PURPOSE RECIPROCATING TOOL GRINDER

Ex-Cell-O takes all the work out of both conventional and chip-breaker tool grinding

Now an entirely new reciprocating double end tool grinder designed by Ex-Cell-O to do two jobs in one—conventional grinding on one end, chip-breaker grinding on the other—has now been added to Ex-Cell-O's line of conventional, double end, carbide and Method X tool grinders. The difference is the adjustable, power-controlled reciprocation of grinding wheels. The operator need only hold the tool at the pre-set angle.

See for yourself the capabilities of this new Ex-Cell-O—contact your local Ex-Cell-O Representative. Or, write direct for Bulletin 461872.

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN
Machinery Division

57-96

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • TORQUE ACTUATORS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

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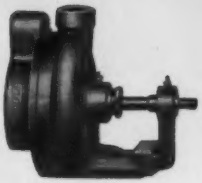
pick your pump from the **fulflo** line of centrifugal coolant pumps

Pick your coolant pumps for performance *and* low cost . . . initially and over the long run. A Fulflo coolant pump is a "cool" choice for dependable coolant delivery.

Model PS4
1800 to 2600 rpm
3½ to 5 gpm

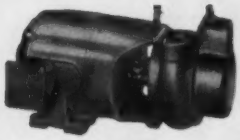
Model KGTS4
1600 to 2400 rpm
12 to 16 gpm



Model FS4
1800 to 2400rpm
35 gpm at 1800rpm

Model 2ES4
1600 to 2400 rpm
10 to 30 gpm

Model FMS
Vertical or Horizontal
¼ hp; 30 gpm
flange mount



Model AGM
¼ to 1 hp sizes
25 to 80 gpm

FULFLO DIRECT-CONNECTED

- Can be arranged for belt drive
- Right or left rotation
- Self-contained priming chamber
- Automatic packing adjustment
- Hardened steel sleeve shaft
- Pipe sizes ⅜" to 1½"

FULFLO MOTOR-DRIVEN

- Special motors with heavy duty ball bearings, totally-enclosed, splash-proof frame
- Centrifugal action insures pumping regardless of chips or grit
- For practically any type of installation

FULFLO

Write for your copy of
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THE FULFLO SPECIALTIES CO., Inc.
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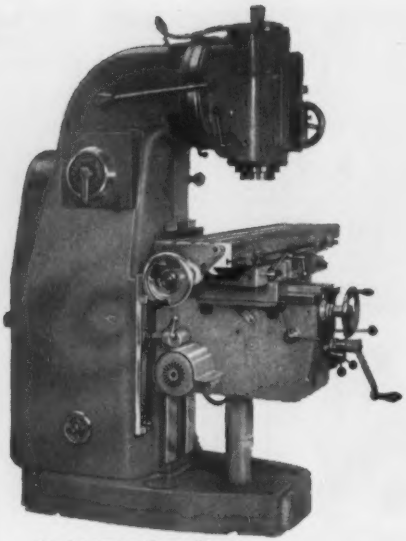


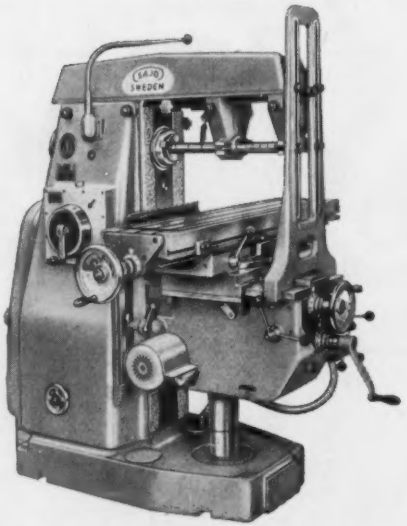
Model VF-54 Vertical Miller

SAJO MILLERS

HORIZONTAL AND *VERTICAL*

SAJO MILLING MACHINES are built to U. S. standards by Swedish craftsmen.

Model PF-54 Plain Miller



- Standard Duty #2 (Model 54) ALL-GEARED Millers—Plain, Universal and Vertical—table 52" x 11", 7½ HP with power feeds (longitudinal 33½"), and power rapid traverse.

Also available as Plain and Universal Millers:

- Light Duty #2 (Model 53) ALL-GEARED Miller—3½ HP with power feeds (longitudinal 24½").
- Light Duty #2 (Model 48) UTILITY Miller—3½ HP with power feeds, longitudinal (24½") only or in 3 directions.

Literature and installations in your area on request.

austin industrial corporation

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INCREASES PRODUCTION...

LOWERS COSTS...

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The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost. Only $110.00 Fixtures (illustrated) extra.*

*Motor equipment:—¼H.P. 110 Volt AC 60 cycle, single phase, swivel motor mount and light—$38.00**

**All prices FOB Chicago.*

★ **MILLS SMALL PARTS MUCH FASTER.**

★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.

★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.

★ **NO MORE COSTLY SET-UP TIME. $110.00*** price so low that it pays to keep one or more Hand Millers always set-up for special operations.

★ **YOU GET A BETTER PRODUCT**—the result of ABSOLUTE ACCURACY.

★ **A LOSS BECOMES A PROFIT** when marginal pieces are finished on the Hand Miller instead of on high cost equipment.

★ **VERY LOW MAINTENANCE.**

★ **USED REGULARLY IN 1163 MANUFACTURING PLANTS** (some of which use as many as 30 machines)—yet on the market a scant few years.

★ **UNIQUE—VERSATILE.** Nothing else like it. One or several machines can be the answer to some of *your* production problems.

Write today for further information.

H. B. ROUSE & COMPANY
2214 N. WAYNE AVE., CHICAGO 14
50 YEARS OF SERVICE TO INDUSTRY

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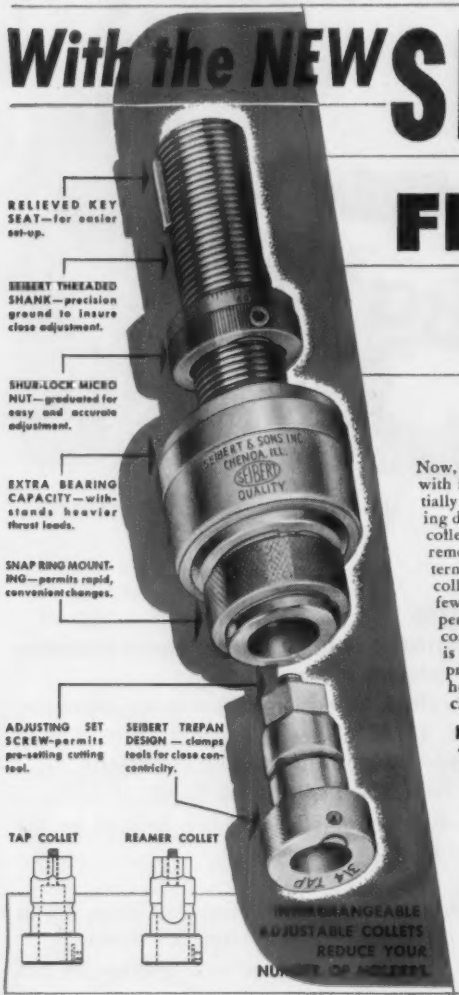
Convenience • Economy • Efficiency •

With the NEW SEIBERT FLOATING HOLDER

(Patent Applied For)


RELIEVED KEY SEAT—for easier set-up.
SEIBERT THREADED SHANK—precision ground to insure close adjustment.
SHUR-LOCK MICRO NUT—graduated for easy and accurate adjustment.
EXTRA BEARING CAPACITY—withstands heavier thrust loads.
SNAP RING MOUNTING—permits rapid, convenient changes.
ADJUSTING SET SCREW—permits pre-setting cutting tool.
SEIBERT TREPAN DESIGN — clamps tools for close concentricity.
TAP COLLET
REAMER COLLET
SEIBERT & SONS INC. CHENOA, ILL. SEIBERT QUALITY
3/4 TAP
INTERCHANGEABLE ADJUSTABLE COLLETS REDUCE YOUR

Fast Change Pre-Setting Collets Reduce Number of Holders Needed

Now, with the new Seibert Floating Holder equipped with interchangeable auxiliary collets, you can substantially reduce costs on tapping and reaming jobs requiring duplicate pre-set tooling. As illustrated, the auxiliary collet is snap-ring mounted in holder for quick and easy removal. No wrenches or drifts are required. An internal adjusting set screw permits pre-setting tools in collet without removing holders. Thus you require fewer holders per job, and because collets are inexpensive you effect substantial savings in overall tool costs. Close concentricity is maintained because tool is accurately held in collet by trepan clamp which is precision machined to close limits. Elimination of hex nut clamping principle also provides extra clearance when tapping in counter bored holes.

Heavy Duty Holder Assures Long Service Life

The holders are heavy duty roller-type and are especially designed with extra bearing capacity to assure long service life. All shank types are available in a range of sizes including the adjustable adaptor shank illustrated. Send for full information today on these new cost cutting tools.

WRITE FOR COMPLETE DATA

Get the complete story on the new Seibert Floating Holder. Ask for illustrated specification sheet or have a Seibert Sales Engineer call at your plant to check over your tooling requirements.

Tension or Compression Tap Drivers
800 Series Spindle Extension
900 Series Spindle Extension
Sur-Lock Adjustable Adaptors

SEIBERT

SEIBERT & SONS, Inc. 1001 E. 24th Street • CHENOA, ILLINOIS

QUALITY MULTIPLE DRILL SPINDLE AND PRODUCTION TOOLS

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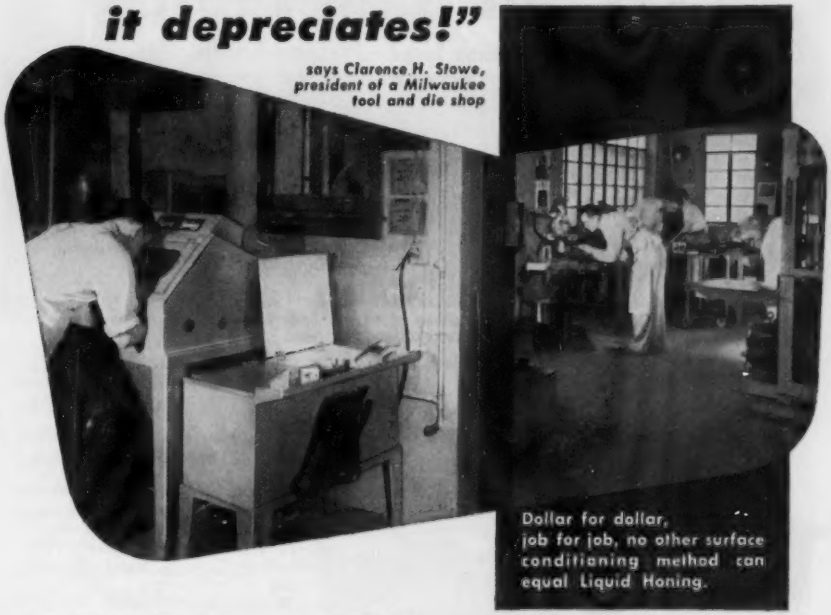
"Liquid Honing* pays for itself 5 times faster than it depreciates!"

says Clarence H. Stowe, president of a Milwaukee tool and die shop



Dollar for dollar, job for job, no other surface conditioning method can equal Liquid Honing.

"Our Liquid Honing machine," Mr. Stowe continues, "enables us to remove heat-treat scale instead of waiting for the heat treater to do it. Consequently, customers get faster job deliveries.

"In only one-fourth usual time, Liquid Honing cleans molds for repairs or remodeling — and ends what used to be a difficult, tedious hand operation.

"Many die casting and plastic molds now go out with an oil-retaining Liquid Honed satin finish that eliminates hand polishing after final heat treating.

"In addition, we clean hand tools, spare machine parts, cutting tools, electrical contacts — anything small enough to go into our machine. So it's easy to understand why Liquid Honing will pay for itself within a year — *five times faster than it depreciates!*"

That's the Stowe story—a "preview" of a few of many advantages Liquid Honing can bring to your tool room, machine shop or die department. You'll be surprised at the low cost — only $550 to $1500 for a standard machine.

Write for details or send a sample part for free demonstration processing.

*Vapor Blast and Liquid Honing are trademarks.

VAPOR BLAST MFG. CO. 3013 W. Atkinson Ave. Milwaukee 9, Wis.

VAPOR V-B BLAST MILWAUKEE WISCONSIN

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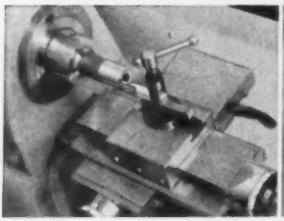
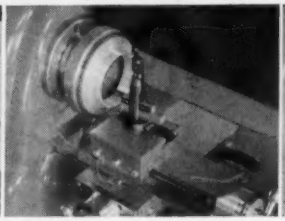
ELMIRA, N.Y.

HIGH SPEED PRECISION LATHE

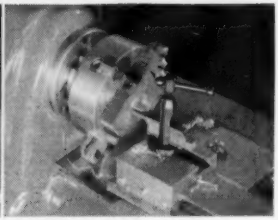
Correct Size - High Speed - Precision Results



Collet Work — The right machine for collet work of 1-1/16" or less diameter.



Step Chuck Work — For rapid and accurate holding of tubing, castings, moldings, stampings and machined parts. Capacity to 6".



Jaw Chuck Work—Integral mount, universal or independent, for extra accuracy. Capacity to 5".

SPECIFICATIONS:
1⅛" Collet Capacity
9" Swing
17" Center Distance
Infinitely Variable Speed
230—3500 r.p.m.

The above three important requirements for proper lathe work in tool rooms, production departments, or laboratories are completely fulfilled by the new Hardinge DV59 High Speed Precision Lathe.

Correct size of the machine in relation to work saves loss from under-capacity production on larger lathes. High spindle speeds, up to 3500 r.p.m., permit full capacity cutting and excellent finish. Sustained accuracy and ease of operation assure precision results.

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"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

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Low cost—high speed hard-facing with the new METCO THERMOSPRAY process

Hard-facing pump rod with the Metco Type P ThermoSpray Gun

High spraying speeds—high deposit efficiencies —simplified application

The advantages of applying hard-facing materials in powder form for lower finishing costs have long been known. But slow spraying speeds, low deposit efficiencies and high material costs have hindered their wide application. Now, with the development of the new METCO Type P THERMOSPRAY GUN and the THERMOSPRAY Hard-Facing Alloys, these disadvantages have been overcome.

The THERMOSPRAY GUN is the first ever developed to operate without compressed air—only oxygen and gas (acetylene or hydrogen) are required. The THERMOSPRAY Powders are new, self-fluxing alloys of the nickel-chromium-boron type especially developed to provide dense, corrosion-resistant coatings with hardnesses varying from RC-30 to RC-65, depending on the alloy used. The new Gun applies these materials faster than any previously available equipment (8 to 10 lbs. per hr.), with deposit efficiencies of over 95%. Depending on requirements, coatings may be fused after spraying, used semi-fused with a newly developed *Metco Process*, or left unfused.

Here is your opportunity to do your own hard-facing at low cost. For further information send off the coupon. No obligation, of course.

METCO

Metallizing Engineering Co., Inc.

1177 Prospect Ave., Westbury, L. I., New York

Telephone: EDGEWOOD 4-1300

In Great Britain: Metallizing Equipment Co., Ltd. Chobham near Woking, England

The following trade names are the property of Metallizing Engineering Co., Inc.: METCO*, ThermoSpray *Reg. U. S. Pat. Off.

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Metallizing Engineering Co., Inc.
1177 Prospect Ave., Westbury, L. I., N. Y.

Please send me more information

- ☐ about the New ThermoSpray Gun
- ☐ about ThermoSpray Hard-Facing
- ☐ Please arrange a demonstration in my shop.

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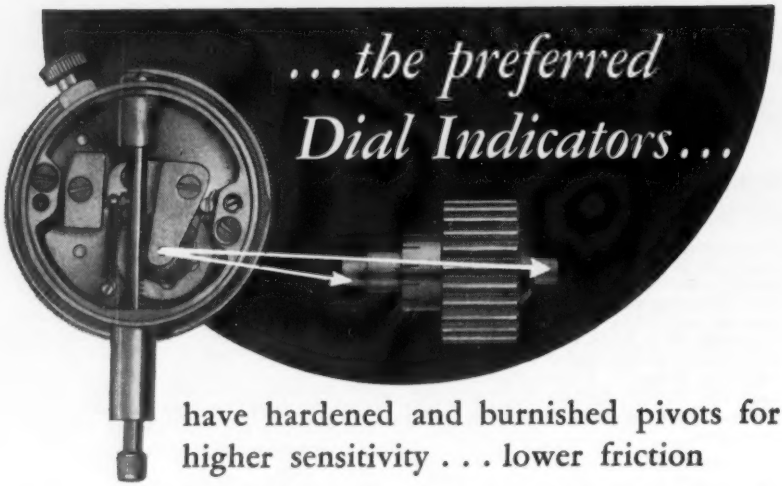

have hardened and burnished pivots for higher sensitivity . . . lower friction

Because metal pivots are stronger than jeweled pivots, Ames has devised a way of hardening and burnishing them to match the sensitivity of jeweled types. The result is a dial indicator that is unsurpassed for accuracy and strength. And it costs *less* than jeweled types. This "funtional" approach is just one more reason why Ames Dial Indicators are so often specified as "preferred". Write today for complete information.

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MANUFACTURERS OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS

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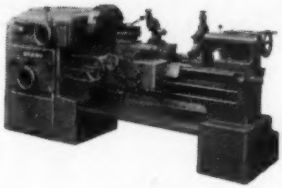

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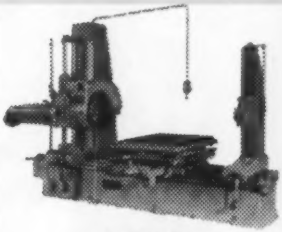

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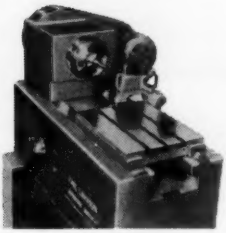

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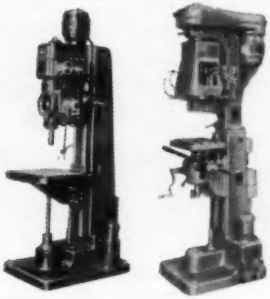
Fine Precision Boring Machine
(Hydraulic Feed)
$2,495



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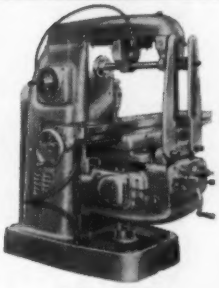

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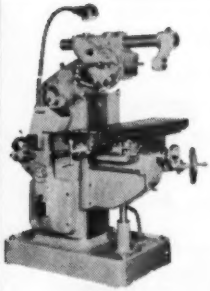

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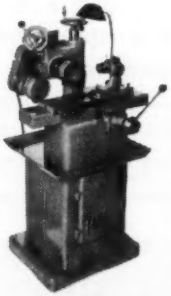
$3,990



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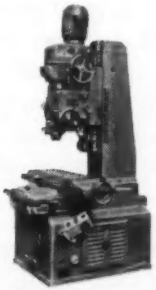

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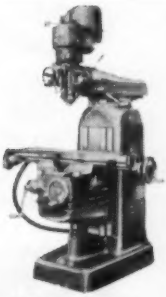

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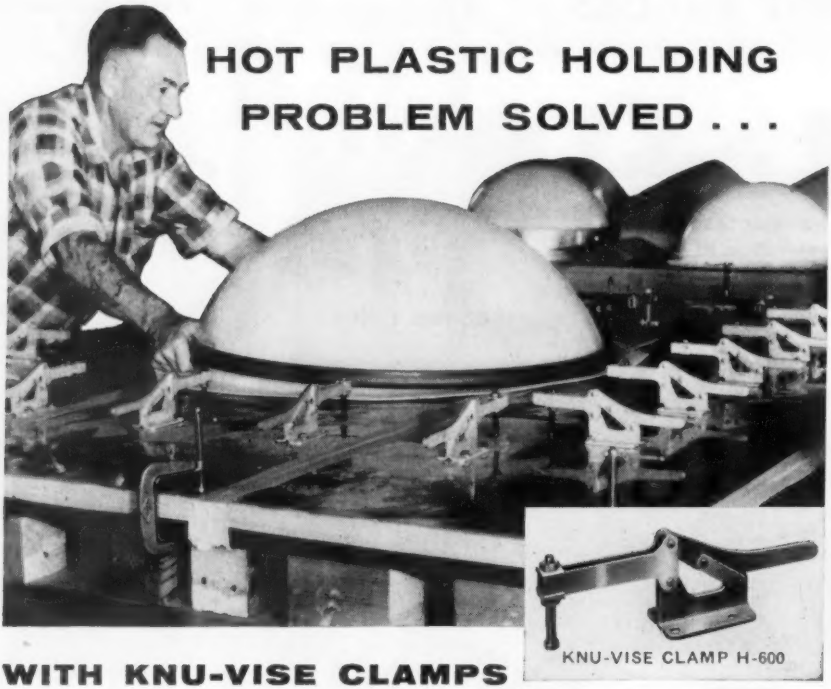

KNU-VISE CLAMP H-600

WITH KNU-VISE CLAMPS

It's a plastic dome skylight . . . produced by "blowing" heat softened plastic sheets under 30 lbs. of air pressure. To hold the hot plastic during the "blowing" process clamping had to be safe, positive, dependable. To handle the various sizes and shapes of skylights produced clamping had to be versatile. And to speed production, clamping had to be fast to grip, quick to release. Knu-Vise clamps provided the answer to all these requirements . . . can answer your holding problems, too. For complete information or engineering assistance write Lapeer today.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS **LAPEER MANUFACTURING CO.**

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That's all. It's a pretty simple operation and no band saw—but no band saw—does it any better than a Famco. So why not find out about a Famco? You'll find it's a lot of band saw for the money.

Ask your dealer about Famco Band Saws or write for a catalog. We have lots of them hanging around and they're not doing us any good here.

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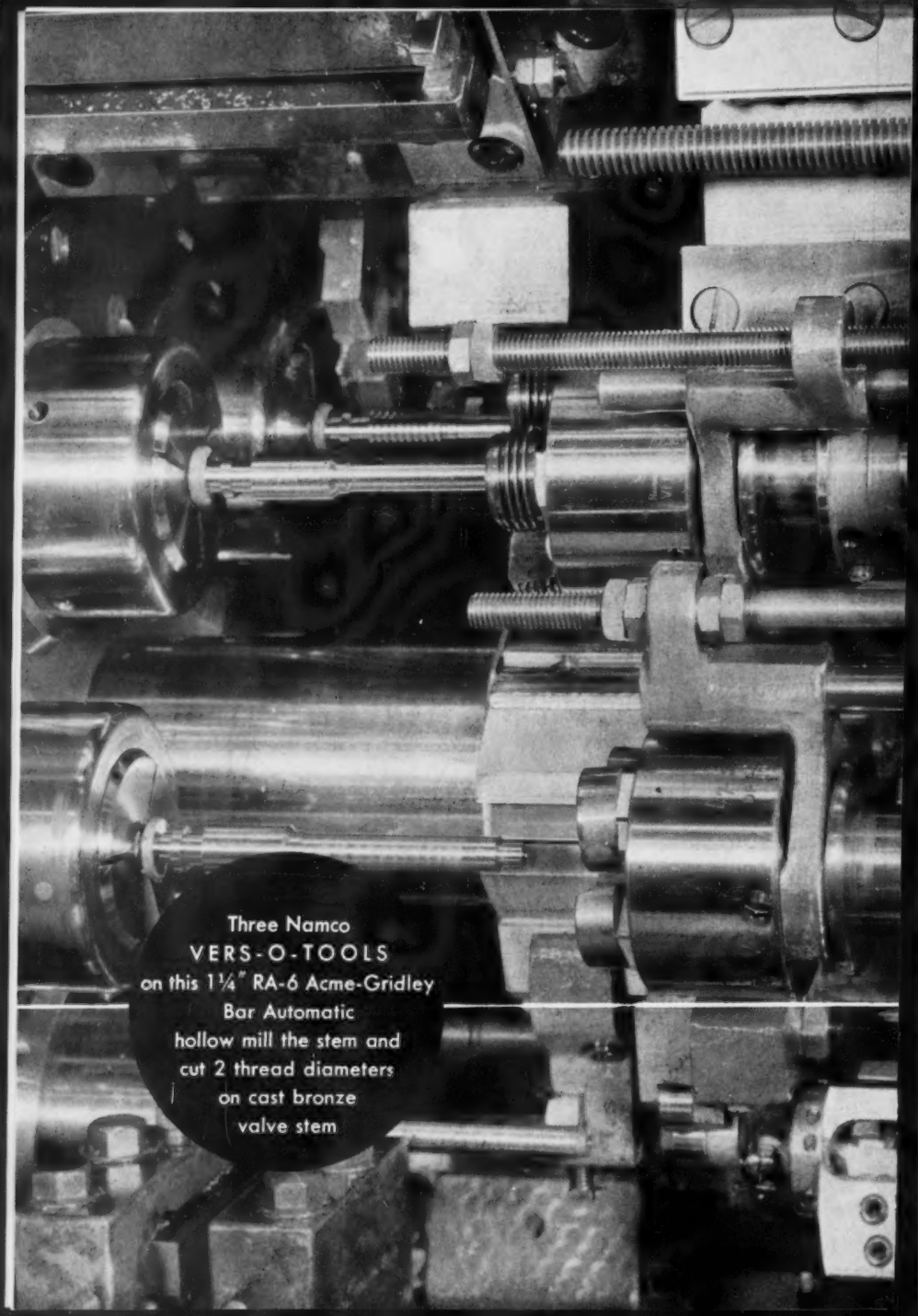
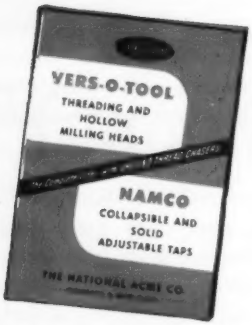


Three Namco
VERS-O-TOOLS
on this 1¼" RA-6 Acme-Gridley
Bar Automatic
hollow mill the stem and
cut 2 thread diameters
on cast bronze
valve stem

Namco VERS-O-TOOL

lets you use the same head... with chasers for threading...or with cutters for hollow milling



Write today for your copy of 48-page Catalog DT-52 or ask our representative to call.

CIRCULAR CUTTING TOOLS reduce costs on threading jobs, end forming and turning.

GROUND THREAD CHASERS provide more threads per grind — and you can regrind to a full 270° of chaser circumference.

BASIC DESIGN SIMPLICITY – fewer moving parts– insures long, trouble-free performance.

NAMCO CHASER GRINDING SYSTEM permits cutter settings to be made in the toolroom without head adjustments — no need for trial error run after sharpening.

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Nos. 0, 1, 2 and 3 in alloy steel and stainless steel are available with the Nylok* feature

You effect major economies in time and money when you design and assemble small devices with self-locking microsize UNBRAKO socket screws. These close tolerance screws won't work loose. They simplify standardization of small devices where maximum reduction of weight is required without sacrifice of strength. They eliminate the necessity of designing costly special screws to fasten tiny parts in compact assemblies and they prevent the waste of production time while waiting for delivery of special screws.

In addition to having the overall advantages of microsize UNBRAKO socket screws, these screws can be used in holes tapped in soft or die cast materials without stripping threads and ruining expensive work. Also the set screws can be used with hardened shafts, since they lock against the threads of the tapped hole.

All UNBRAKO socket screws can be supplied with the self-locking Nylok feature. The UNBRAKO with Nylok is a single self-locking unit. No auxiliary locking devices are needed. Seated or not the screw locks positively wherever wrenching stops. The screw won't work loose because the tough resilient nylon pellet forces mating threads together.

Self-locking microsize UNBRAKO socket cap and set screws are available in sizes #0 through #3, in heat treated alloy steel (plated or unplated) and stainless steel, at your authorized industrial distributor. To serve you well, he also carries a complete stock of other self-locking UNBRAKO socket screws. Or write us for literature and samples. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 22, Pa.

*T.M. Reg. U.S. Pat. Off., The Nylok Corporation

We also manufacture precision titanium fasteners. Write for free booklet.

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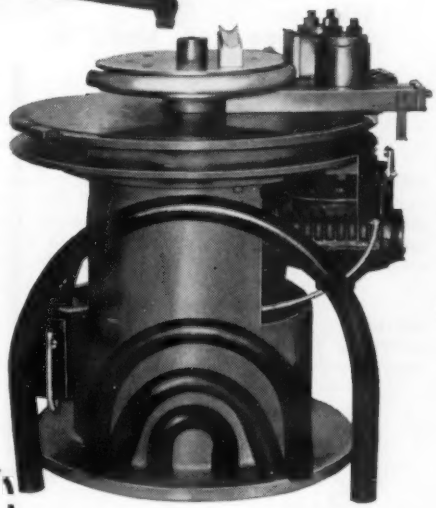

Are you undecided on the most economical way to bend pipe, tubing or structural metal parts?

Let Pedrick show you some surprising figures on "multiple bending" with PEDRICK PRODUCTION BENDERS.

Write PEDRICK TOOL and MACHINE COMPANY, 3640 N. Lawrence St., Phila. 40, Pa., Dept. 5.

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PRODUCTION BENDERS

Free "Pedrick Line" Bulletin. Write today.

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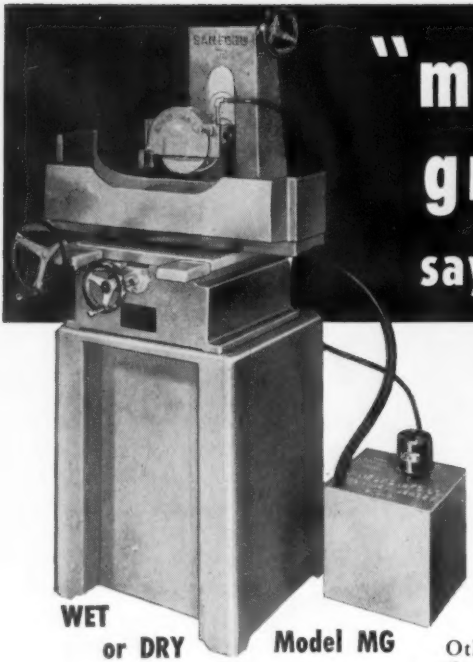

"most used grinder" say customers

WET or DRY **Model MG**

In checking with the tool, die, gage and general production shops that use SANFORD SURFACE GRINDERS, the most frequent comment was that Sanford Grinders were the "most used" of any grinders in the shop.

PARTIAL SPECIFICATIONS—

Capacity — 8" x 12" x 12".
Table travel — 13", traverse 8¾".
Vertical clearance 12" under 7" wheel.
Standard grinding wheel — 7" x ½", 1¼" hole.
Spindle speed approx. 3000 RPM.
Motor, ½ HP, single or 3 ph., dynamically balanced.
Floor space — 45" x 38" x 62" high.
Net wt. with stand approx. 630 lbs.

Others have tried to copy but there's a "feel" that comes from the precise individual quality and workmanship that goes into every SANFORD GRINDER. It's the factor that can't be found in any other grinder.

So widely used you can ask users in your own area how they like the low priced Sanford Surface Grinder.

Write for illustrated and fully descriptive literature, reconditioning facilities, optional equipment and prices.

Representatives in major industrial areas

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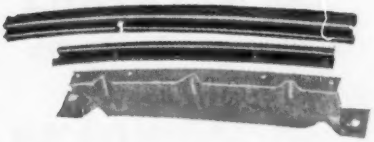
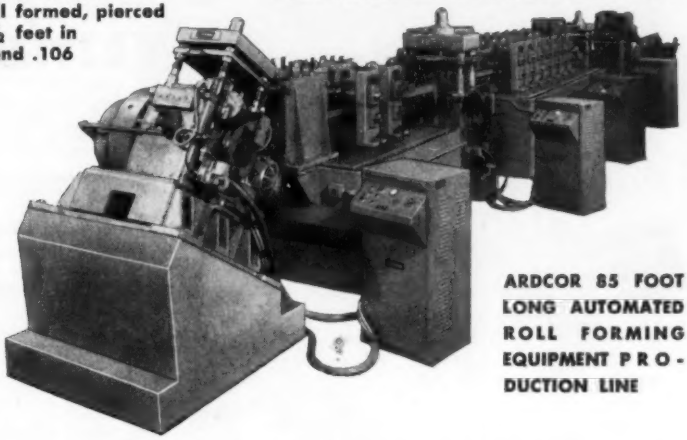
High Speed Roll Forming...TIMED IN SECONDS



Upper and Lower Seat Tracks completely roll formed, pierced and coiled 1½ feet in length; .078 and .106 gauge steels.

. . . UP TO 45 SEAT TRACKS PER MINUTE, Roll Formed, Pierced, Coiled and Cutoff on this ARDCOR Completely Automated Production Line



ARDCOR 85 FOOT LONG AUTOMATED ROLL FORMING EQUIPMENT PRODUCTION LINE

ARDCOR Roll Forming Equipment, now used by one of America's leading Automotive Manufacturers, for roll forming Upper and Lower Seat Tracks for 1957 model cars.

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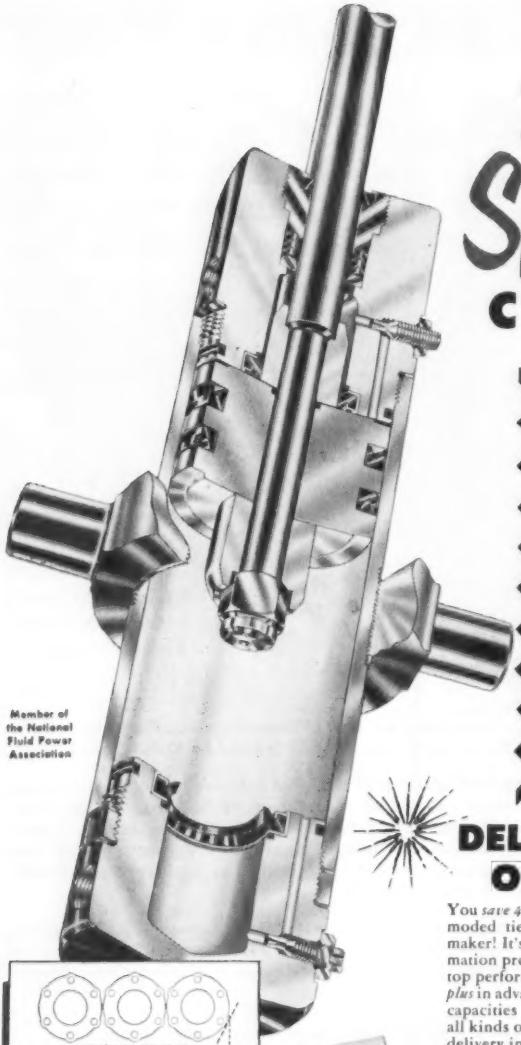

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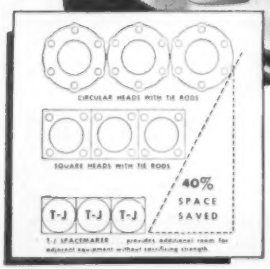

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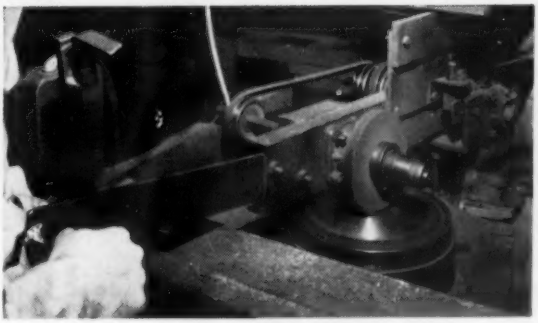

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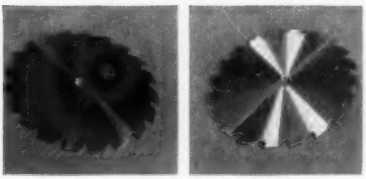

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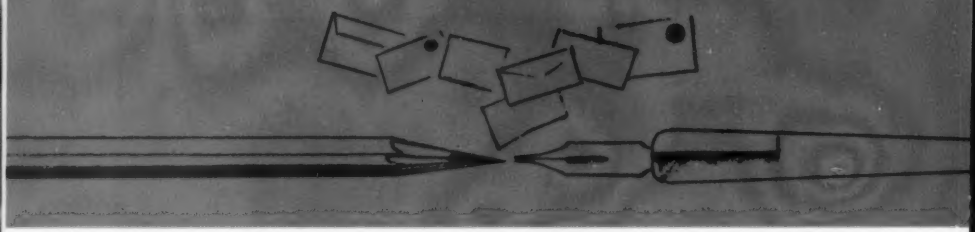
OVER THE EDITOR'S DESK . . .



PRODUCT RELIABILITY

Speaking recently on the subject of quality control before a meeting of the American Management Association, H. Thomas Hallowell, Jr., expressed grave concern over the need for American industry to begin to realize that it is "playing in an entirely new ball game — one in which things are just moving faster —mechanically, mentally, and psychologically; where national defense may hinge on a mere handful of missiles and where, in industry, almost anything is cheaper than a customer complaint that may lead to lost business."

As immediate targets for reliability improvements to produce a better and safer tomorrow, Hallowell cited the following: "The $20-billion annual repair and servicing bill of the consumer; the increasing incidence of auto fatalities, many of them due to mechanical problems: the missiles defense program, now at a stage where rocket experts openly accept a 50-50 chance of missile success as typical of the state of the art.

One of the fundamental obstacles to hurdle in this country, Hallowell said, is the fact that too much of our American production-line thinking is being used at a time that calls for more "missile age thinking." He defined missile age thinking as the realization that "all" the parts must work—regardless of size or importance—no matter how seemingly insignificant any one part may seem at first glance. Russian ability to bring this about evidently has made possible their satellite successes.

The increased tempo of technology—the faster speeds, the higher temperatures, the greater forces—is the primary cause of making mistakes today more costly. More mistakes are more likely to occur simply because things are becoming more complicated. He cited the increasing complexity of product design, the growing number of component parts, and the multiplying quantity of mechanical and electrical devices.

Reliability—the quality factor—is of vital importance to industrial and consumer product manufacturers alike. Reliability must emanate from the top in order to permeate an entire industrial organization. Management must adopt a "quality" frame of mind, insure a flow of

69.5 out of every 100 GRAND RAPIDS SURFACE GRINDERS sold, are purchased by firms already owning one or more — 30.5 by new customers.
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OVER THE EDITOR'S DESK . . .

capital investment into new tools and techniques of quality control and work more vigorously for sound, yet economical, industry standards.

★ ★ ★

WHO'S TO BLAME?

On the matter of inflation—"Orthodox economists blame high prices on scarcity. Rightists blame them on the welfare state. Leftists blame them on semi-monopoly. Mr. Reuther blames high prices. General Motors blames high wages.

"Professor Spahr blames being off the gold standard. Professor Fisher blames credit-inflation by the banks. Mr. Patman blames dear money. President Eisenhower blames lack of restraint on the part of irresponsible business and labor leaders.

"Mr. Baruch blames lack of earlier price controls. Senator Byrd blames the burden of debt and taxes. Everyone has his own pet theory! And everyone laughs at his neighbor for his ignorant and childish views."

The foregoing comments by Major L. L. B. Angus, a financier who recently penned a vigorous critique of "Popular Money Fallacies," hint at the complexity of the inflation problem. Cruel distortions of the general price level are a result of many forces and conditions, of cost pressures, demand conditions, expectations and governmental policies. Much of this tricky process, on which many catch phrases miss essential points, is traced through in a new study, The Mechanics of Inflation. This pamphlet is available from the Economic Research Department, Chamber of Commerce of the United States, Washington 6, D. C., at one dollar per copy.

With the gross misconceptions so prevalent today, greater understanding of the issues, problems and pitfalls is an important need. This new pamphlet will provide needed new light.

★ ★ ★

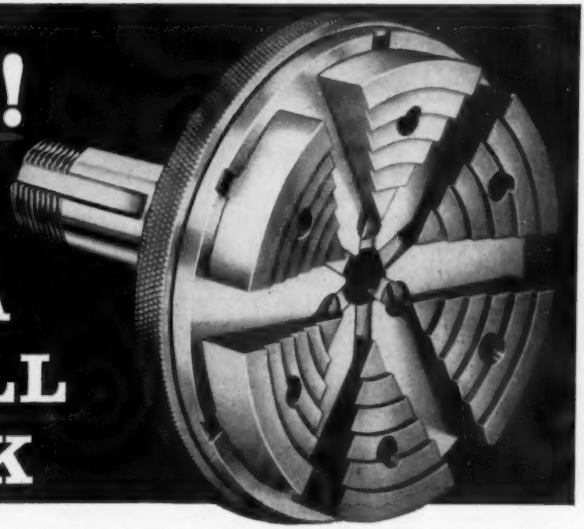
TOWARD GREATER CONFIDENCE

The Cincinnati Post of the American Ordnance Association turned its recent annual meeting over to a Missile Preparedness Conference. The program consisted of a series of reports by a panel representing each of the armed services. Mr. Alvin G. Waggoner, Office of the Special Assistant to the Secretary of Defense for Guided Missiles, led the panel. He reported that so far the United States has spent about twelve billion dollars for guided missile research and development. Expectations are that we will continue to spend over a billion dollars a year for the same program. This expenditure is separate from Project Vanguard and the satellite program.

Representing the Army, Col. John H. Swenson, Office of Guided Missiles, Office of the Assistant Secretary of Defense (Research and Engineering), looking somewhat anachronistic in his crossed sabers

New!

ALINA SCROLL CHUCK



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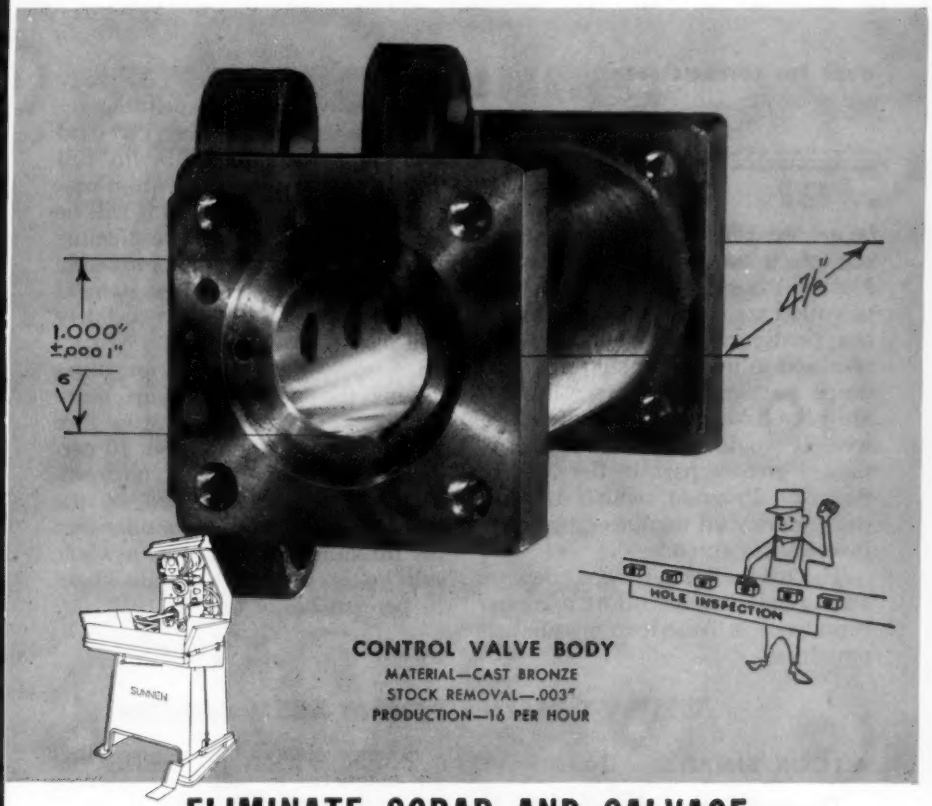
OVER THE EDITOR'S DESK . . .

of the cavalry, reported on the recently recovered nose cone. Hailing the flight of the first man-made meteor, Col. Swenson noted the manifold theoretical and practical problems involved in the program, from aerodynamic heating to shark repellant. He pointed out that this was not a "neat scientific trick" but a practical demonstration that the warhead of a missile can be delivered to the target after a trip through space in functional condition.

Pointing out the unique problems of the Navy (limited space, constant motion, and corrosive sea air), Capt. L. M. Slack, Director, Surface Weapons Systems, Research and Development Division, Bureau of Ordnance, noted that the Navy has broken through many of its difficulties and now has operational missile vessels, U.S.S. Canberra and Boston. Further trials are still undeway aboard U.S.S. Mississippi and Norden Sound. The manifold and multiple mission of the Navy necessitates a whole arsenal of missiles from the Terrior to the Thor. Progress is being made to the eventual goal of missiles for every ship in the fleet, from frigates through submarines to battleships, appropriate to the mission of each.

The Air Force which has "deliberately sought the day of the missile, done everything in its capacity to bring it about, has led and is still leading the development" was represented by Col. E. A. Kiessling, Assistant Deputy Commander for Weapons Systems (Guided Missiles), Headquarters, Air Research and Development Command. He pointed out that the Matador, which has been in use for several years, is now dispersed "around the world" at strategic locations. He reported that the Atlas and Thor are both in the testing stage. It fell to him to make one of the most surprising statements when he said that missile development actually began in World War I when the old Flying Corps, actually flew, under a short controlled flight, an unmanned "flying torpedo."

At the banquet following the conference Reuben B. Robertson, Jr., Former Deputy Secretary of Defense and now president of the Champion Paper and Fibre Co., Hamilton, Ohio, was awarded the Charles L. Harrison Award for Distinguished Ordnance Service. Answering recent criticisms of the missile program he said that to his knowledge the research and development portion of the program has never been hampered by a lack of funds, most of which have latterly been needed for testing purposes. While he approved the appointment of a coordinator of research he felt that had the missile development, in its early stages, been delegated to one agency, the progress thus far made would not have been attained. Looking to the future, he predicted more cross-service managership and greater integration in terms of missile missions rather than traditional divisions. Cross servicing, he said, has gone about as far as it can go without standardization between the services, which he predicted would



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be achieved now that the inventorying phase is nearing completion. Noting the role that industry will be called upon to play, Mr. Robertson predicted that businesses will be asked to inventory supplies until usage patterns and attrition rates are established by the armed services. It would also be expected to take a greater part in the Mutual Security Program, which has become more vital than ever, by larger investments abroad.

The total effect of the conference was to give the spectators a greater confidence in American missile preparedness.

★ ★ ★

A LOOK AHEAD

The machinery industry, bulwark of our economy in 1957, is likely to be one of the soft spots in 1958, according to a report compiled by Arnold Bernhard & Company, investment advisers. Capital spending, at a peak in the fourth quarter of 1957, is expected to decline in 1958. Machinery order backlogs have been shrinking and this will probably be reflected in a lower rate of shipments which will continue for an indefinite period.

Based on studies of the contemplated plans of businesses, the downturn in machinery demand as a whole may be modest, probably no more than 10 percent. But its impact will vary widely from company to company. Capital spending by utilities is expected to rise. The road building program may be in full swing by the end of 1958. Companies supplying these fields will be affected hardly at all. Manufacturers of equipment for the petroleum, chemical and electrical equipment industries should enjoy a fairly well-maintained business.

On the other hand, companies serving the steel, aluminum, automobile and textile industries face declines of much more than 10 percent. The trend is likely to be downward throughout 1958 and, by the end of the year, indications are that the machinery industry as a whole will be operating at a rate about 10 percent below that of 1957.

★ ★ ★

RUSTING AND MAGNETISM

Science always has believed that all magnetic metals become more magnetic when their temperatures are lowered. Now it has been learned that the reverse can be true. By adding aluminum to iron, Ford Motor Company scientists have created an alloy whose magnetic properties decrease, instead of increase, at low temperatures.

"Since the addition of aluminum to iron creates an alloy that also is non-corrosive, we suspect our discovery may be an important clue pointing to a close relationship between rusting and magnetism," said Dr. Michael Ference, Jr., director of Ford Scientific Laboratory.

The phenomenon displayed by Ford's iron-aluminum alloy is called

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Regardless of the kind of stainless steel you're working with—chromium-nickel, non-hardenable chromium, or hardenable chromium—there's an Armco free-machining grade to help you cut machining costs. Here is a list of these special Armco grades in each family:

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Armco 18-8 FM Se . . . . . (Type 303 Se)
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FERRITIC CHROMIUM TYPES

Armco 17 FM . . . . . (Type 430 F)

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Armco 12 FM . . . . . (Type 416)
Armco 12 FM Se . . . . . (Type 416 Se)
Armco 13-C-35 FM . . . . . (Type 420 F)
Armco 17-C-100 FM . . . . . (Type 440 F)
Armco 17-C-100 FM Se . . . . (Type 440 F Se)

All these grades are produced in a wide range of shapes and sizes in both bar and wire. All are available through your nearby distributor of Armco Stainless Steels. Check with him for your needs. Most Armco Distributors stock standard sizes and grades for immediate delivery.

If you don't know the name of the Armco Distributor nearest you, just write us at the address below. We'll gladly help you get in touch with him.

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OVER THE EDITOR'S DESK . . .

antiferro-magnetism. Until now, it has been found only in certain chemical compounds. In conducting their laboratory experiments, the Ford scientists lowered temperatures to within three degrees of the absolute zero mark of minus 459 degrees Fahrenheit.

They employed liquid helium to reach this extremely low reading. Normally a gas, helium changes into a liquid at minus 452 degrees Fahrenheit. Then when other materials are immersed in the helium, they also are brought to this temperature. Reduced pressures applied to the helium lower the temperatures still further.

★ ★ ★

HEAT TREATING REPORT

Mr. K. U. Jenks, President, Metal Treating Institute recently issued an optimistic report regarding activities in the field of commercial heat treating with the comment that the year 1957 saw highly significant expansion and improvements in plant and equipment.

Through the years the commercial heat treater has been a leader in the development of new and improved methods for heat treating metals, and the modern commercial heat treating plant today, boasts the finest and most up-to-date equipment. Never in its history has the industry been in such an excellent position to meet the ever-increasing demands placed upon it.

There have recently been substantial increases in the volume of nitriding and in the demand for induction heating of large members. It is significant that both processes reduce distortion with improved surface fatigue properties. Nitriding and induction facilities have been added in commercial plants including motor generator sets with large scanning equipment.

Considerable attention is being directed toward methods for reducing time and cost of carburizing. Higher temperature carburizing (over 1700 deg. F.) is being evaluated. High frequency induction heating in the presence of carburizing gases, for shallow case depth, is being explored. Controlled carbon concentration plus carbon restoration is becoming routine in most commercial heat treating plants.

★ ★ ★

PROMISING

In automotive research, there is much current activity in the development of die cast aluminum engine blocks and heads and it is reasonable to assume that this activity eventually will result in production techniques for producing these parts. Extruded or cast aluminum bumpers, with inserts of stainless steel or vinyl plastic to protect them from denting, looks promising. Aluminum radiators are undergoing extensive tests. Stylists already are beautifying roof areas which low silhouettes expose to view. In future designs, decorative aluminum may be considered for this purpose.

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CUSTOMERS SPEAK ON

MACHINE TOOL DISTRIBUTING AND ENGINEERING SERVICES

Based on a series of interviews conducted by the American Machine Tool Distributors' Association with three executives of important manufacturing companies.

Executives responsible for machine tool planning, procurement and use constitute an important and influential "public." Hence their views on machine tool distribution efficiency are most significant. To obtain these views first hand, the American Machine Tool Distributors' Association interviewed three executives of important manufacturing companies. Their comments, which follow, contain interesting and practical guideposts and suggestions on how to make the most of machine tool distributing and engineering services.

* * *

By E. W. ALLEN
Purchasing Agent,
Diamond Chain Company, Inc.

From the customer viewpoint, our experience has been that the trend toward "localizing" machine tool distribution is a healthy one, and should be encouraged. During 1956 our company purchased approximately 80 percent of our machine tools from local distributors serving the Indianapolis area or from locally based representatives of machine tool builders. About 20 percent of our machine tool requirements was bought direct.

While we fully appreciate that economic and cost factors may make it impractical for some builders to localize their machine tool sales engineering and service operations, the fact remains that local or at least regional service is, on the whole, more convenient, more economical and more advantageous to most users of machine tools.

In our own case most of the tools and other productive equipment we buy to produce roller chains and

allied equipment for more than 130 different industries are highly specialized. Diamond Chain's productive operations make use of all basic types of machine tools in a wide variety of special applications which must be carefully planned and integrated with our processing.

Consequently, we like to have available—and close at hand—the knowledge and experience of qualified local distributors who have long been completely familiar with our operations and our productive tools and equipment. In making the most efficient use of the products of some 42 machine tool builders, we place considerable and well justified reliance in the sales engineering and service staffs, as well as the top managements of some 20 able distributors of machine tools serving the Indianapolis area.

It gives purchasing, engineering and manufacturing departments a comfortable feeling of security to be able to consult, work and plan regularly with conscientious local business men who live and work in the same community and have common community, as well as business, interests with their customers.

From the standpoint of such important matters as savings in time and money, we find the local machine tool distributor an invaluable asset. Representing many lines of machine tools, he can and does keep us fully and continuously informed on new design developments that can contribute to our production efficiency and economy. We save money every day because alert distributor sales engineers keep us informed on price, as well as product and design trends in the industry.

About the Author

E. W. ALLEN, Purchasing Agent, Diamond Chain Company, Inc., Indianapolis, Indiana, joined the Johns-Manville Corporation upon graduating from high school and business school and, from 1932 to 1942, served in the payroll and purchasing departments of this firm. In 1943 he entered the employ of Diamond Chain as Assistant Purchasing Agent. He was promoted to his present position of Purchasing Agent in 1949.

The local machine tool distributors' broad knowledge and understanding is practically indispensable to our process engineering planning and our capital equipment budgeting and procurement.

As a matter of practical customer relations, the local or regional machine tool distributor will be the first to agree with the customer that a machine tool sale isn't complete unless the machine is properly installed and working to the satisfaction of the customer and according to the specifications for which it was designed. Because he is "local,"

"It gives purchasing, engineering and manufacturing departments a feeling of security to be able to consult, work and plan with local business men in the same community..."

the distributor is both willing and able to devote the amount of time, personal energy and resourcefulness to the important job of rendering continuous service on the machines and tools he sells. The Indianapolis area distributors who serve Diamond Chain, we find, regard continuous service as one of their most important day-to-day and long-range responsibilities. There have been no instances in which we have experienced delay or serious difficulty in obtaining proper service from local machine tool distributors and the builders they represent.

* * *

By FRANK GILL
Production Engineer,
Chrysler Corporation, Indianapolis Plant

In the best practical sense of the word, the capable machine tool sales and service engineer can be fairly described as a compatible and certainly a useful production engineering "associate" of the manufacturers with whom he works. Because efficient tool function is the heart of the production operation, it's important that the association between the production engineer and the machine tool sales and service engineer be a close and harmonious one, based on mutual respect and understanding.

Accessibility is certainly one of the most essential attributes of this technical and business association for best results, in terms of both tool engineering and productive, economical and efficient tool future. The production engineer who has in his plant area local machine tool distributors who are "at home" with his particular problems and objectives and requirements knows he possesses a valuable resource, if he appreciates it and uses it as effectively as possible.

We in production engineering in the Indianapolis transmission plant of Chrysler Corporation *have been most favorably impressed with both the professional abilities and the energetic and industrious skills made available to us by the competent group of machine tool distributors serving industries in the Indianapolis area.* We have found that we can call upon the knowledge and experience of the local machine tool distributors' sales and service engineering staffs with complete confidence that they will make important and useful contributions that help us solve research, design,

installation, operating and maintenance problems.

The local Indianapolis machine tool distributor, we have found, demonstrates in action, as well as words, that he and his staff have just as vital an interest in our production progress and efficiency as they have in their own business.

In our experience, the capable machine tool distributors serving our operations have fully grasped the importance and essentiality of rendering a complete and diversified service both before and after the sale of a machine tool. Distributors with whom we deal do a tremendous amount of close and practical first-hand studying of our operations—department by department — and their continuous study equips them ideally to assist us in special design and research and production-planning projects.

Handling several lines of machine tools gives the local distributor both the broad knowledge and the flexibility he needs to assist us not only in research and planning, but also in meeting daily production problems requiring special tooling or quick replacement or adjustments of parts, fixtures and attachments.

We appreciate and value the cooperation and contributions of the local machine tool distributor. We have found him, on the whole, a most accessible and able "associate" in expediting and implementing production efficiency all along the line from research and development to preventive maintenance.

"We have been favorably impressed with the professional abilities and energetic and industrious skills made available to us by distributors serving the Indianapolis area."

* * *

By P. N. CRAVARITIS
Director of Manufacturing,
Litton Industries, Maryland Division

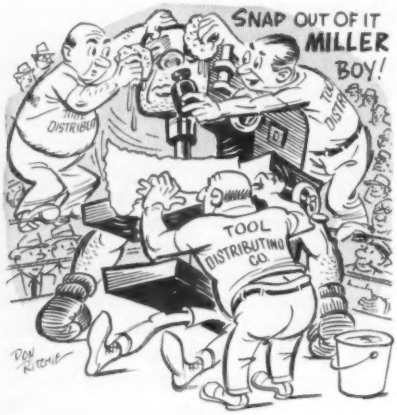
Integrity of service—the follow-through after the initial sale of a piece of equipment—is to me the key function that a machine tool distributor provides to the using industries he serves. There are a number of other advantages we have gained through continuing business relations with distributors, but the availability of immediate service in operation and production is by far the most important. It can and, in our case, has saved substantial costs in interruption and down time.

Most production men will agree that a machine tool, no matter how well designed and built, no matter how carefully maintained and used in its proper applications, is basically no better than the quality of the service it receives after it is installed. *This is particularly true in a high-precision operation, which involves a continuing maintenance*

problem to keep equipment in perfect operating condition.

From a cost standpoint, when we require service we must have it quickly. With our distributor close at hand, we invariably get it. Back in the days when machine tools were hard to get and easy to sell, such service in the machine tool industry was less than perfect. But our distributors were just as reliable then as we find them under normal competitive conditions today.

Since both machine tool planning and operational servicing must be on a continuing basis, the local machine tool distributor who makes it his business to be both knowledgeable and quickly assessible is also a most useful source of practical information and varied know-how. So many factors must be reckoned with, so many maintenance and operating problems speedily resolved in modern manufacturing that the servicing of machine tools must be for practical purposes on a round-the-clock basis.



"This is particularly true in a high-precision operation, which involves a continuing maintenance problem in order to keep equipment in perfect operating condition."

There has been, in my opinion, no adequate evaluation of the full value to users of a competent local distributor organization. Not the least of the many services he provides is that of an information center for new developments and tool data from the builders he represents. This important data, screened to eliminate unnecessary information, thus becomes quickly available as current news geared closely to the interests and operating needs of local industries.

The value of the distributor is not limited to these aspects of service, however. In the initial selection of a piece of equipment needed to improve or expand some phase of operations, like any other purchaser we try to get the most for the money involved. This involves the factor of special tooling and determining the standards to which the new equipment is built. If possible, the budget should not have to cover new small tools and adapters. With these factors in view, a distributor can be of important help in selecting the right machine for the process or function involved, and the right machine from a long-range cost standpoint as well.

I feel particularly qualified to evaluate the role of the distributor in today's high-precision industry since my responsibilities cover not

only purchasing but production planning and control, as well. In the light of my experience, we will continue to look to our machine tool distributors in the purchase of new equipment, not only because they have provided us with such outstanding service on the present equipment we have acquired through them but because we are confident they will do so in the future.

★ ★ ★

Fundamentals of Mechanical Design. By Richard M. Phelan. Published by The McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. 526 pages. Price, $8.75.

This new book has been designed to present the fundamentals of mechanical design to engineering students in a minimum amount of time by the integration into one book of the most important concepts normally covered in the design sequence for mechanical engineers: kinematics, mechanism, dynamics of machinery and design of machine elements. The major emphasis is placed on what can be done, what principles are involved and where one can find the additional information that may be required in the actual design of mechanical elements or a machine.

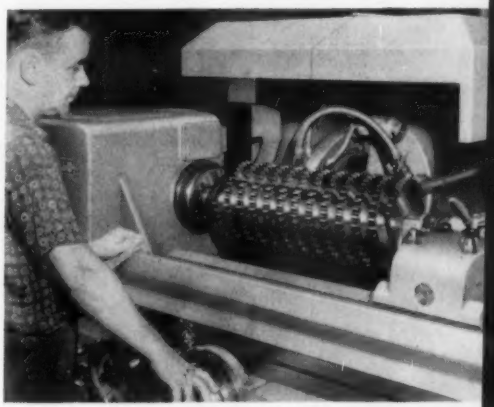
Keeping in mind the rapid growth of all fields of engineering and the necessity for constant revaluation of the curricula, the author has written this book primarily as a textbook, and not as a complete manual of mechanical design for the practicing machine designer. The philosophy makes it valuable as a starting point for engineers not currently in very close contact with the field of mechanical design.

★ ★ ★

Thread Grinding a Large Worm Gear

Ex-Cell-O Corporation recently utilized one of its Style 36 precision thread grinders to finish the thread form of a huge 10-inch o.d. worm gear. Furnished in rough form by a milling machine manufacturer, the company finish ground the hardened steel part in one of its Detroit plants. Equipped with a standard three-way cradle type dresser, the Style 36 grinder machined the thread form of the big worm to a triple 6-inch lead, 29-degree included angle. Stock was removed to a depth of 1⅜ inches and amounted to 0.170 inch. Pitch diameter was specified at 8.0763 inches.

For more data circle 70 on Postpaid Card



Huge worm gear is finish ground on grinder equipped with 3-way cradle type dresser. Thread form of big worm is machined to a triple 6-inch lead, 29-degree included angle.

What Happens When You E

Anyone considering use of numerically controlled equipment may well profit from a reading of this first-hand account of pioneering experience at The Martin Company.

By LEON E. LAUX

Chief, Manufacturing Research & Development, The Martin Company, Baltimore Division

The successful introduction of numerical control into The Martin Company culminates more than a year of careful preparation for integration of this new machine tool concept into its engineering design and manufacturing operations. Since Martin is one of the first companies in the aircraft industry to install a numerically controlled machine tool it is possible that our experience would be of interest and aid to those who are considering the use of this type of equipment.

The influence of numerical control on a well established and going materials processing organization cannot be over-estimated. Practically every operation necessary for the transformation of an idea from the origin of a design on down through the production of a part is subject to radical change. Being aware of this fact, an indoctrination program for all personnel who were to be engaged in materials processing for and the operation of our numerical control system was drafted and put into effect, a year before the delivery of our machine.

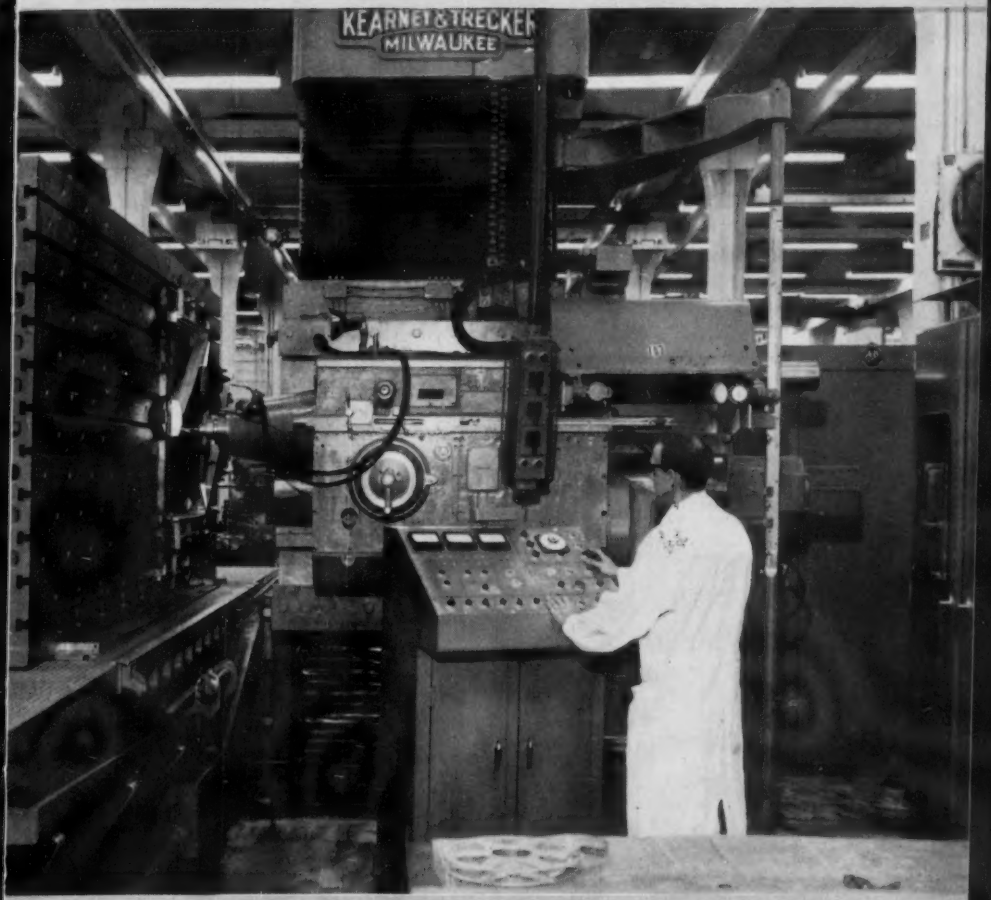
This program entailed:

1. Defining what was to be done in each and every step of the processing procedure.
2. Selecting qualified personnel for materials processing, equipment operation and maintenance.
3. Providing specialized training in computer technology and operation.

In implementing this program we realized that, with a majority of our machine tools still under manual and template control, it would be necessary, for the time being at least, to plan for both mediums of production.

Our conventional engineering drawings and processing methods could *not* be completely abolished in favor of numerical control. However, the system of dimensioning engineering drawings could be alter-

ou Employ Numerical Control?



Overall view of numerically controlled milling machine. This machine can mill one part in two hours instead of in eight hours as required with conventional equipment.

". . . the key man in our entire materials processing team is the manufacturing pre-planner."

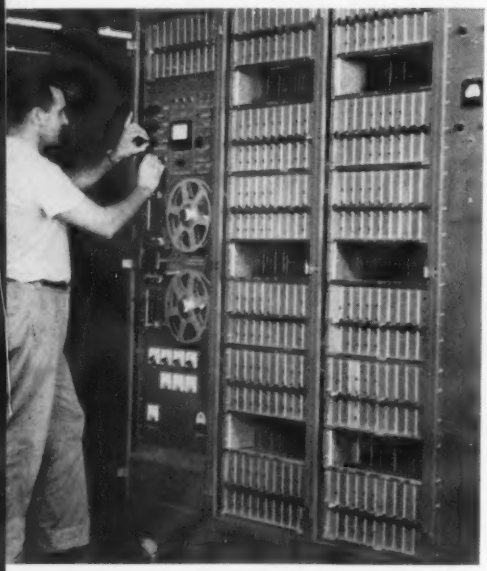
ed to permit a more rapid translation of dimensions into numerical control data.

Our experience to date indicates that the key man in our entire materials processing team is the manufacturing pre-planner. Having a fairly good knowledge of manufacturing methods, machinery and specifically metal cutting technology, he establishes the effectiveness of the entire numerical control system.

Once the basic numerical plan is established for a particular part, the remaining steps of transforming the plan into a machine control tape are fairly routine.

They consist of:

1. A write-up or manufacturing plan is first prepared describing, in detail, all conventional and numerically controlled machining operations and instructions.
2. Preparation of a numerical control drawing, which is a pictorial representation of the part, showing the path of the cutter as well as the sequence of cuts in lieu of conventional dimensions.
3. Preparation of a numberical control process sheet, containing machining data in numerical control code.
4. Preparation of the paper process tape, Flexowriter typing of the data appearing on the numerical control process sheet.
5. Retyping for verification of the original process tape.
6. Feeding of the process tape data through the computer and punching of the machine control tape.



Maintenance man makes marginal check on control unit for numerically controlled mill.

All tape preparation is accomplished in an air-conditioned, humidity-controlled room located in our manufacturing engineering office. Only the machine control tape, the write-up, and part drawing are forwarded to the shop. All other data, such as the numerical control drawing, the numerical control process sheet and the process tape, are

filed for future use in the Manufacturing Engineering office.

This is but a brief summary of our indoctrination program. Obviously there are many more details that I won't take time here to explain, since much of this information is now available from the Aircraft Industries Association, leading universities and equipment builders for those of you who are planning to install numerically controlled machines.

Although we presently have several different types of tape controlled machines in operation at Martin, I will limit my discussion to our experience with a three-dimension, punched tape controlled profile milling machine delivered to our Baltimore Division in June of last year. Exactly three weeks after delivery we made our first trial cut. During the next two weeks the machine was subjected to trial runs to assure the proper functioning of the machine and its control unit.

A series of acceptance tests were devised by Martin engineers to determine the accuracy, repeatability and dependability of the complete system. These tests were quite comprehensive and took a full week to complete.

The inspection reports on these tests brought out some significant facts. First, they showed that, while the accuracy obtained on the machined parts was very good, it was not quite up to the one and two thousandths tolerances that we had expected. Even so, we were getting a plus or minus five thousandths tolerance, and this was being achieved by workers operating a new system for the first time.

The inspection report went on to state that it appeared the feed rate was too fast in relation to the cutter diameter, which caused deflection of the cutter. To verify this report, positioning tests were then run in which the free running spindle was programmed to cross the 10 by 4 foot work surface diagonally and return to the starting point.

In 10 of 10 such tests it was found that the spindle returned to its starting point within a range of 0.001 inch. This showed conclusively that the control unit had a high degree of repeatability and that the run-out was caused by deflection of the cutter. Therefore, it appeared that with a cutter and holding fixture of sufficient rigidity, it would be reasonable to expect that we

This view shows inspection of machined part and acceptance of tape by Quality Control.

". . . we expect the machine to run maintenance free 85 to 90 percent of its planned operating time."

could lower the 0.005-inch runout and possibly obtain the 0.001 to 0.002-inch tolerance that was originally expected.

The slightest lack of rigidity in the tools can greatly reduce the degree of accuracy that may normally be expected from a control tape. The day of having a machine operator grind tapers on cutters, add clamps to the fixture or make trial cuts in order to compensate or correct for discrepancies is a thing of the past.

None of these things is practical with numerical control. Once the tape is punched and the cut is made, it must be right.

Our machine has been in operation too short a time to give you a comprehensive report on its reliability. But, from observations made during three months or so of operation, we expect the machine to run maintenance free 85 to 90 percent of its planned operating time.

Perhaps this estimate of down time sounds high to you, but we must remember that we are handling here a piece of equipment that

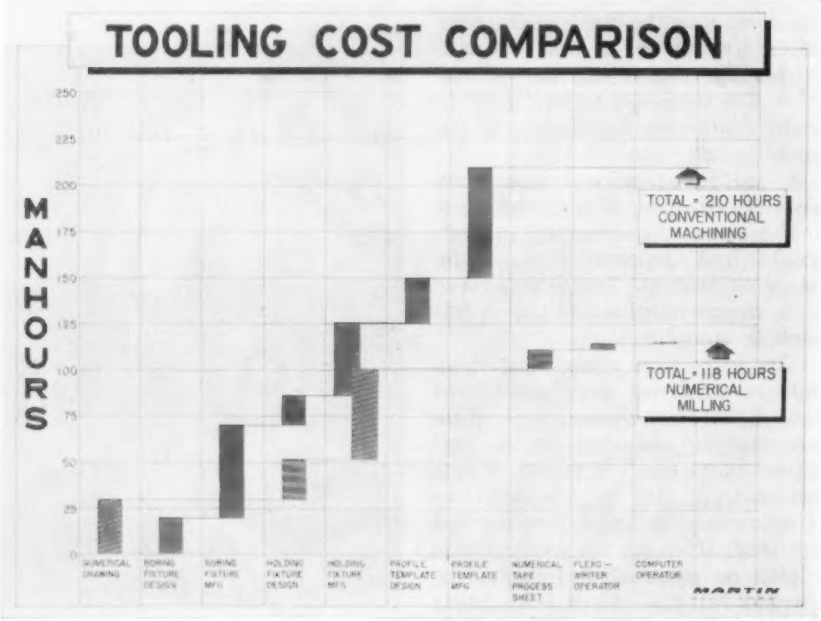


Chart showing tooling cost comparison of conventional machining with numerical milling.

is far more complex than anything we have had in a machine shop before. Some reduction in this down-time is expected when operating personnel gain a better knowledge of the system and can more quickly detect and correct routine troubles. In addition to this 10 to 15 percent down-time encountered while in operation, we spend from 30 to 60 minutes each day, just prior to going into operation, for preventive maintenance.

This preventive maintenance program, as now established, consists of running test tapes which bring into operation all phases of the machine control unit. Marginal checks are also run to determine if any electronic components have failed or are weak and about to fail. These tests not only lessen down-time for repair but also will possibly prevent a ruined part due to later failure of a component in the control unit.

Another periodic check that must be performed is the alignment of the milling machine. This alignment check is essential since any misalignment will be reflected in the machined part.

Here again we have a condition that cannot be compensated for, by the machine operator, as is possible on a conventional machine. He can operate the numerical equipment only in accordance with what has been programmed on the tape. Even if this tape is perfect, the machine

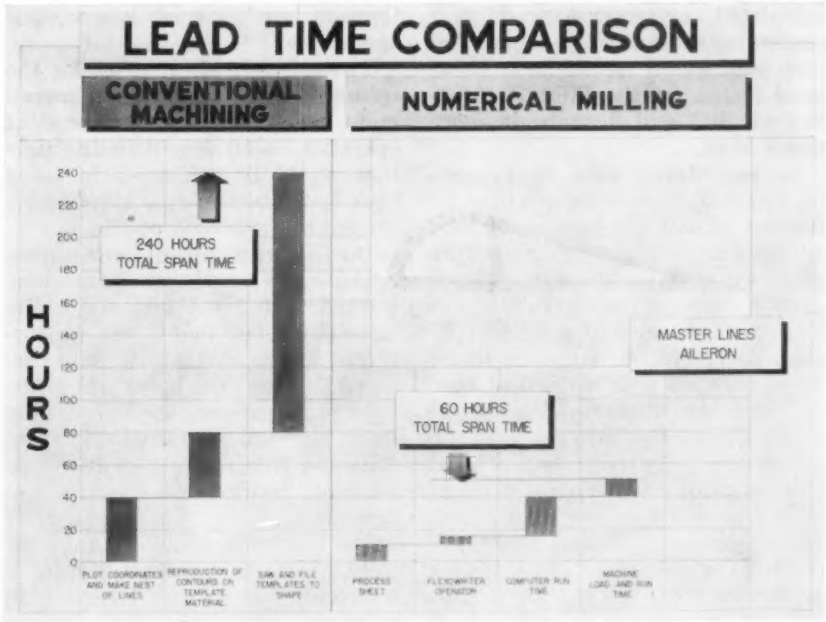


Chart showing lead time comparison of conventional machining with numerical milling.

"By the time we made the last correction, we were using speeds and feeds 100 percent greater than planned."

will produce parts that deviate from the nominal dimensions in direct proportion to the amount of machine misalignment.

A short time after our machine was installed, we ran a part which inspection refused to accept. We spent hours checking the tape before we realized that the machine was out of alignment. So, due to the natural settling of the machine foundation, we now check the alignment once a month and we will continue to do so until the settling ceases.

After the acceptance tests were completed, we started production machining on a limited basis. The first part was a rather large bulkhead fitting for the P6M SeaMaster, which I will describe in more detail later.

In machining this first part, we found that we were spending 50 percent of our time changing and adding clamps to the holding fixture while the machine stood idle. Much of this lost machining time could have been avoided if we had considered the heavier cuts and faster feeds possible with numerical control and had positioned the clamps where they would have provided the greatest amount of rigidity and least amount of cutter interference.

As you would expect, we also had many errors in the first tape. But, in order to avoid making a completely new tape each time we discovered an error, we decided to break the job into operations having about four feet of leader between them.

In this way, when we came upon an operation that was incorrect, we simply cut out that operation and inserted the corrected one. However, by doing this, it meant that at the end of each operation the spindle would return to a reference point. There was, of course, a definite reaction against this procedure because, as the spindle returned to the reference point, it was cutting air, not material. However, until we are thoroughly experienced in the making of tapes, we intend to continue to break the job into various operations.

The few seconds it takes for the spindle to return to the reference point and then go on to the next operation is far less than the time that would be consumed in going back to the beginning and repeating the entire machining operation.

During the initial machining tests, it was noted that the machine worked with an abundance of reserve power and that it was obviously not doing all that it could. So, as we replaced the bad parts in the tape, we increased the speeds and feeds on the corrected tape for roughing cuts where a heavier cutter could be used and accuracy was secondary.

By the time we had made the last correction, we were using speeds and feeds 100 percent greater than originally planned.

In spite of all the mistakes on

this first tape, the results were highly gratifying, for we had reduced the rough machining time to one-fourth of that formerly required by conventional methods. Also, we had gained a wealth of experience.

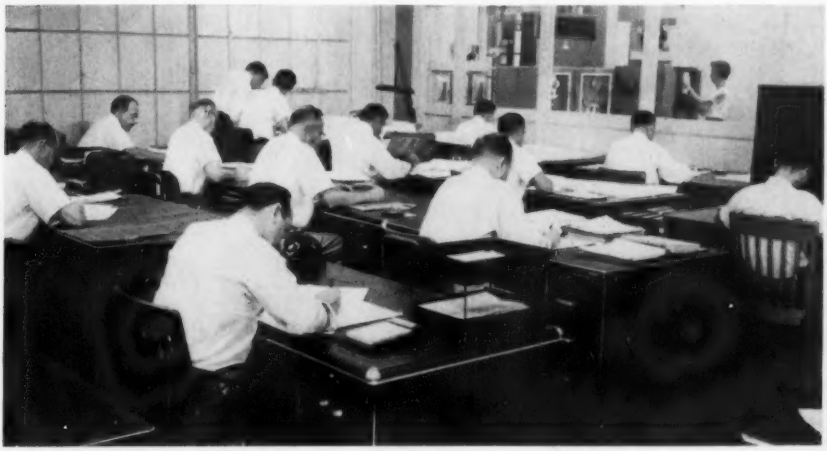
These are a few of the growing pains that are inherent in such a new concept. While none of us like mistakes, they have not been entirely in vain, for with each one we have learned more about the limitations and potentialities of this new system. To us, at this point, the potentialities seem limitless.

And, by way of example, we have just recently perfected a method of taking engineering master lines formulae and programming them on tape to machine templates. These templates are furnished to the Engineering Department and are used to scribe the desired lines on loft templates, thus bringing about a saving in manhours and an increase in accuracy. Duplicates of these produced by this same method are made for both Tool Manufacturing and Quality Control use.

But the job has only begun. The indoctrination of all people concerned with this new system must be broadened and made more comprehensive. The potentialities of numerical control can be realized only if we train people to think in terms of numerical control.

Their thinking must be bold and imaginative so that all of the possibilities of this new system can be realized. Certainly their thinking must be as modern and efficient as the machine they work with. And this can come about only if they are thoroughly trained to understand this new concept.

Editor's Note: The foregoing account of the experience of the author was presented before the Third Annual Machine Contouring Conference which was conducted recently in Los Angeles, California.

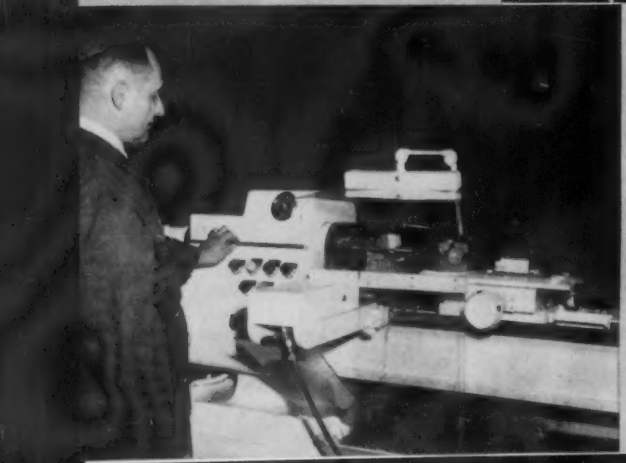


View of numerical control personnel area with the computer room in the background.

Random at Metal

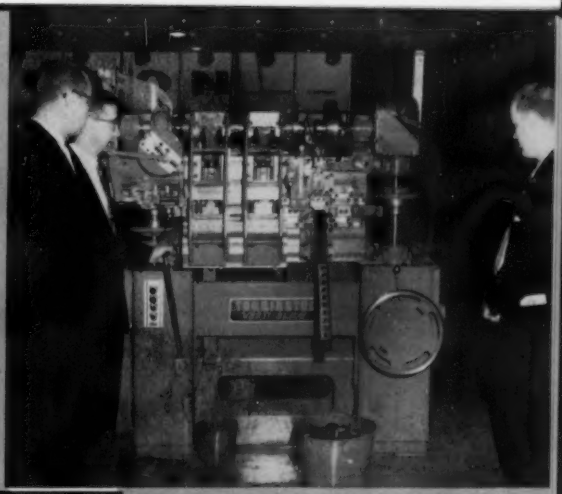
ABOVE: Howard Prutton (right), President of the Prutton Corporation, Cleveland, Ohio, discusses the 250 piece per minute Prutton Model 200 Thread Rolling Machine with M. Schroeder, Maintenance Foreman, Templeton, Kenly & Company, Broadview, Illinois.

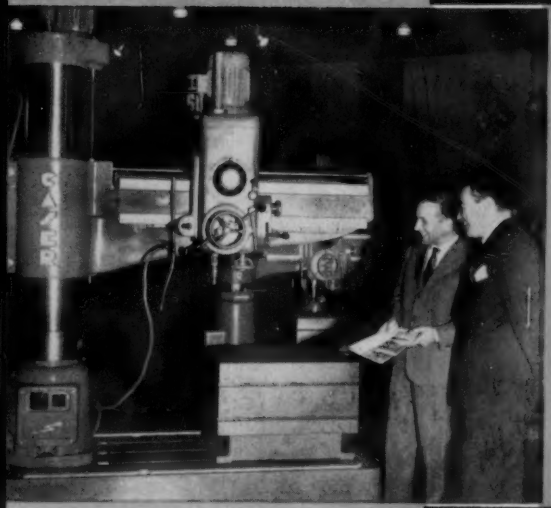
RIGHT: Lester E. Haaf (extreme left), Foreman, Heat Treat Department, Bucyrus-Erie Co., South Milwaukee, Wis., listens as C. H. DuSell (left center), Sales Engineer for Thor Power Tool Co., Chicago, Ill., explains how a Thor power tool would help solve his problems.



LEFT: One of the many operating exhibits was this Sheldon Power Operated Turret Lathe, Model ZWM-56-P. The machine has a variable speed drive with a maximum of 2,000 r.p.m.

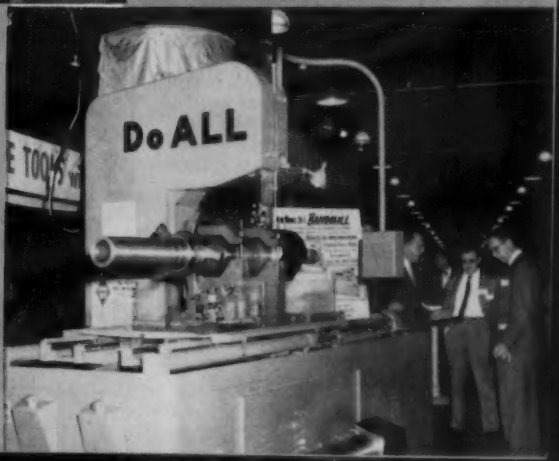
Shots the Show





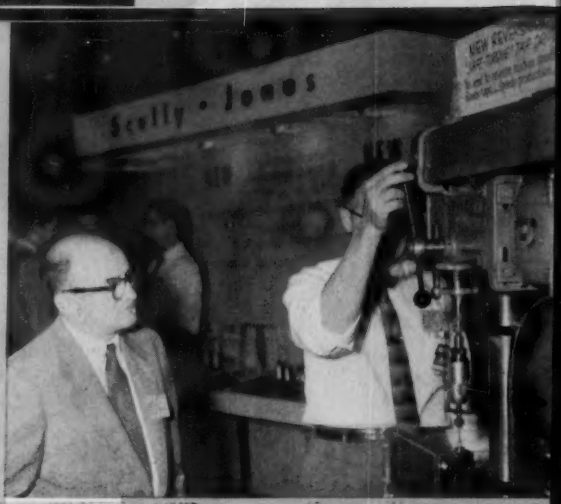
ABOVE: R. Carlson (center), Tool Engineer, demonstrates the Torrington Verti-Slide Machine to Mike Muehlhausen (left), Cost Reduction Department, and Charles Erickson (right), Draftsman, both associated with the Muehlhausen Spring Division, Logansport, Indiana.

LEFT: Serge Toumaniantz (right), President of Maserati Corp. of America, and Lino Regali (left), President (Admin.), Ernest Casati and Son, Pavia, Italy, express satisfaction over the Caser F 35, 4-foot radial drill. Casati and Son is manufacturer of the machine.



RIGHT: DoAll Model 26-5 Bandmill, here shown working on pentagon turret bars, is obvious topic under discussion by Manley Hanson (extreme left), President, DoAll Cleveland Co.

RIGHT: John Brown, Marketing Manager for Scully-Jones & Company, demonstrates Reversible "Safe-Torque" Tap Driver. So new it is not yet on the market, this model was completed for the show.



LEFT: Emory Bryan (left), Field Engineer of Metallizing Engineering Co., Inc., Westbury, Long Island, N. Y., explains the electronically controlled Metco Type K Metallizing Machine to D. P. Sharma, visitor from India.

RIGHT: F. C. Shields (left), Manager of Sales, Forging and Casting Division, Allegheny Ludlum Steel Corporation, demonstrates a point while Edward Dailey (center), Chief Inspector of company's Dunkirk, N. Y. plant, stands by to answer technical questions from C. A. Strack (right), Product Supervisor, Hooker Electrochemical Company. Visible at the left rear is car with stainless steel body, a regular feature of Allegheny Ludlum's exhibits.

LEFT: Harry J. Beck (left), Sales, Black Drill Company, Inc., Cleveland, continues to demonstrate Hardsteel Drill as he swaps news with John M. Krings, Vice President, Modern Machine Shop.

RIGHT: Joseph Dobrick (right), President of Spitfire Tool Company, is interviewed by Robert I. Shore, Managing Editor of Modern Machine Shop, as he sets up Automatic Gyromatic Small Parts Flat Lapping Machine.

LEFT: Dr. Walter Stuhlmann (right), Director, Quality Control, IBM-Germany, Wurtenberg, Germany, listens as Vincent E. Lysaght (center), Sales Manager, Wilson Mechanical Instrument Div., American Chain and Cable Co., Inc., describes the "MO" Tukon Hardness Tester. Dr. Otto Schaaber (left), Director of the Institute for Heat Treating, Breman, Germany, became so interested he forgot that he was being photographed.

SEARCH FOR MODERN METALS

The author tells how better, stronger, purer metals are being produced today for tomorrow's metal products.

By E. C. BISHOP

Materials Manufacturing Department,
Westinghouse Electric Corporation,
Blairsville, Pennsylvania

Technical advances in such fields as aviation, missiles, electronics, and nuclear energy have created a need for new metals that previously have been little more than laboratory curiosities. For example, the development of the gas turbine has demanded high-strength structural materials that can operate at temperatures of 1200 to 1500 degrees F. This need has, by and large, been adequately filled by alloys based on iron, nickel, and cobalt, the "building blocks" of our conventional high-temperature alloys today. But the efficiency of a gas turbine increases with temperature and therefore alloys are needed that can operate at 1800 degrees F. and higher—a temperature range which cannot be served by iron, nickel, and cobalt base systems.

Another example is in the missile field, where high speeds develop extremely high skin temperatures. Today's commercially available alloys simply will not stand up.

Table I lists the melting points of a number of metals available to metallurgists. Iron, cobalt, and nickel—the present building blocks for virtually all our high-temperature alloys — have relatively low melting points, below 3000 degrees F. There are more than a dozen metals with higher melting points, some almost twice as high as iron. Many of these can be ruled out for

commercial purposes simply on the basis of their scarcity in nature. After these, seven metals remain whose availability in nature make them reasonable sources for future high-temperature alloys. Of these, tungsten, molybdenum, columbium (or niobium) and chromium appear to offer the best future.

The big problem in developing alloys of these four metals lies in the fact that at, or even near, their melting point they react with air, most other gases, and any known refractory material. This means that conventional methods of melting, hot working, and heat treating that are done either in air or make use of conventional refractories are impossible to apply to these metals. Hence, the primary job has been to develop new methods of performing these operations. Most of the effort is still being expended on melting.

A conventional method of melting relatively pure metals of the common garden variety is air-induction melting. Its basic principle is simple. Current passing through an induction coil creates a field within the coil and metal placed within that field is heated to its melting point. Many specialty alloys of relatively high purity are melted this way with substantially no serious contamination.

The first logical improvement step was to exclude air from the melting process. This was done by putting the induction furnace in a steel chamber that could be evacuated. Vacuum-induction melting at pressures close to one millionth of atmospheric pressure has now become commonplace. However, it is still necessary to resort to melting in a refractory crucible, which usually results in intolerable contamination in the case of reactive alloys.

Another vacuum-melting technique, called vacuum pouring, consists of taking an air melted heat of material and pouring it into an evacuated chamber in which the mold which will receive the metal is located. By this means some puri-

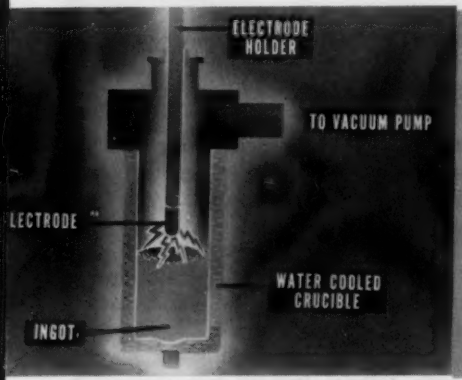


Fig. 1—Schematic diagram of a consumable electrode vacuum arc melting furnace.

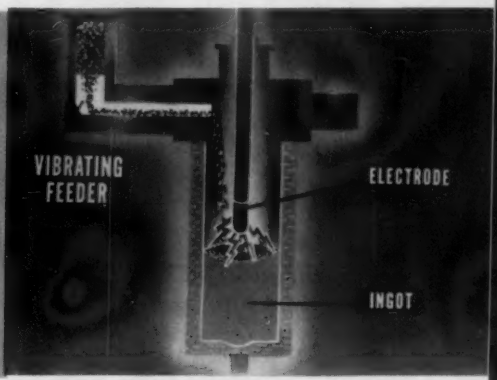


Fig. 2—Schematic diagram of a nonconsumable electrode vacuum arc melting furnace.

About the Author

EDWARD C. BISHOP was born in Manila, Philippine Islands in 1919. He attended preparatory school in the United States and received a B.S. degree in metallurgy from Massachusetts Institute of Technology in 1941 and an M.S. degree in metallurgy from M. I. T. in 1942. From 1942 to 1946, he served in the U. S. Army Corps of Engineers, in the Aleutians and Okinawa, being released to inactive duty with the rank of Captain. He joined Westinghouse Electric Corporation in 1946 as engineer on atmosphere heat treating processes. Since 1950 he has been associated with the company's Specialty Alloy Pilot Plant, working on different high temperature and magnetic alloys and serving in various supervisory positions. He assumed his present position in 1957.

fication of the metal is attained, and commercial heats of metal as large as 150 tons are being regularly made.

The first real solution to the contamination problem came with the development not so long ago of the cold-hearth melting or arc-casting furnace, as shown in Fig. 1. The raw material to be melted is made into the form of an electrode and, under the action of an arc, is melted into a water-cooled, copper crucible in an evacuated chamber. Contamination by either air or a refractory crucible has thus been avoided to a great extent. One drawback, however, to this method of melting, is the need to form the raw material into an electrode, usually done by compacting a sponge or powdered form of the material. The electron bombardment furnace (or nonconsumable electrode furnace) circumvents this problem, however, by substituting a tungsten electrode for the compacted metal electrode, as shown in Fig. 2. The actual metal that is to be melted is then fed into the furnace in either granular, shot, or powdered form.

Another variant on the arc-casting furnace is the drip-pool melting technique which still makes use of an electrode of a raw material, but the electrode is melted by a surrounding induction coil rather than by an arc. The electrode melts and drips off into the pool kept molten by a pancake extension to the induction coil. The advantage of this method is that much better control of the melting process can be obtained than in conventional arc casting.

Even these methods have the limitation that some contamination of the melt occurs by contact with the copper crucible and this impurity can be serious when extremely high purity metals for research studies are needed .

The melting crucible is eliminat-

ed entirely in a new process called levitation melting. In this method, induction heating is used to melt the metal but the coil is conical shaped, which means that the resultant electromagnetic forces created by the coil have a net upward push. By careful juggling of coil dimensions, power input, and other factors, the coil will actually suspend the metal in mid-air, so to speak, while it is molten, as illustrated in Fig. 3. For most metals, this melting is done in a container filled with an inert atmosphere, such as argon, or even in a vacuum. Not only can metal be melted with this technique, but it can also be cast into a small ingot mold to form a shaped casting.

All these methods have been designed to maintain the purity of the starting metal. But what if the purity of the starting material is somewhat questionable to begin with? Can a metal be melted and refined at the same time? Zone refining is a technique which does just that. Essentially the method consists of placing a bar of the metal to be purified in a refractory boat and slowly passing these two through a small cylindrical induction coil. As the bar passes through the coil, a small segment of it is melted and this molten zone moves along the bar as the bar passes through the coil. By making repeated passes of this type, impurities in the metal, which tend to lower its melting point, are gradually pushed to the "finish" end of the bar while impurities which raise its melting point

Metal	Melting Temperature (Degrees F.)
Tungsten	6170
Rhenium	5740
Tantalum	5425
Osmium	4900
Molybdenum	4760
Ruthenium	4500
Iridium	4449
Columbium	4380
Rhodium	3571
Chromium	3430
Zirconium	3365
Thorium	3300
Platinum	3224
Titanium	3140
Vanadium	3100
Hafnium	3100
Paladium	2829
Iron	2802
Cobalt	2723
Yttrium	2700
Nickel	2651

Table I — Melting points of a number of metals currently available to metallurgists.

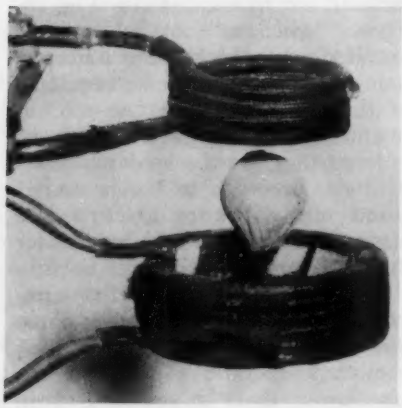


Fig. 3—Conical-shaped induction coil produces upward force, thereby holding and melting metal sample in space, as shown.

". . . the closest approach to obtaining perfectly pure samples of metals has been made by growing 'whiskers' . . ."

are moved toward the "start" end of the bar. This process has produced metals of purity levels far exceeding any ever attained before. This method is not just a laboratory curiosity. All the germanium and silicon being used to make transistors, rectifiers, and similar devices for transistorized radios and hearing aids, had to be purified by just such a zone-refining process.

Purification of reactive metals such as titanium, zirconium, niobium, which would react with the refractory boat, has been accomplished by combining levitation melting and zone refining, as shown in Fig. 4. The conical coil supports the molten zone of the bar while the bar is moved through the coil to obtain zone-refining action. Prior to this operation several longitudinal fins are machined on the bar which do not melt during the process because their large surface area permits them to remain cooler than the center of the bar. Hence they act as a cage which together with the surface tension of the molten metal contain it. This process is called cage-zone refining.

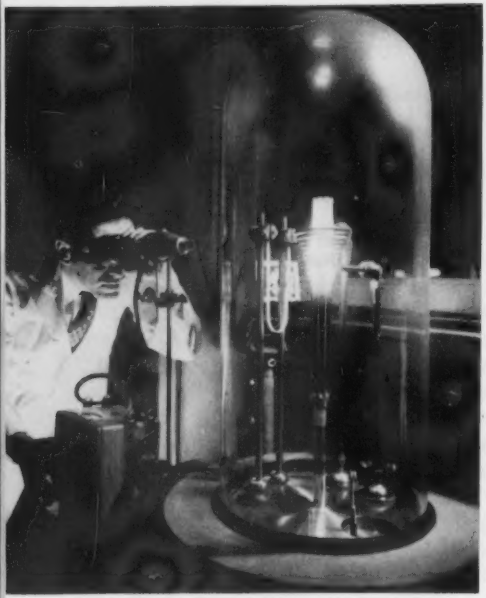


Fig. 4—Cage-zone refining is described as a method of progressively melting a metal bar from end to end. Impurities follow the molten zone to the end of the bar.

Actually the closest approach to obtaining perfectly pure samples of metals, has been made not by a melting technique, but by growing "whiskers" from ionic salts of these metals, as illustrated in Fig. 5. These "whiskers" are about one hundredth the thickness of a human hair and their measured strength is of the order of about one million pounds per square inch. This work is important, from a research point of view, in order to better understand what factors govern the strengths of metals and how better ones can be designed.

It is natural to expect contamination of a metal during forging, hot rolling and heat treating even though temperatures are appreciably lower than those reached in melting. As far as hot-working operations are concerned, it is staggering to visualize performing them

in a vacuum, so the first approach to solving this problem has been to do the job quickly. Literally, the hot-working operation is performed as fast as possible, in order to minimize the length of time the hot metal is in contact with air. In the field of forging one recent development which helps in this problem, although only to a minor extent, has been the development of "Impacting" as a substitute for conventional forging.

In conventional forging the material remains stationary on one die and is struck, usually vertically, by another die, whereas in Impacting the piece is suspended between two dies that strike it horizontally simultaneously. It can be shown that up to 100 percent more work is imparted to the piece using a blow of the same number of foot-pounds with Impacting over conventional forging, since in the latter case the stationary die often absorbs a considerable amount of energy imparted by the one moving die. As a result, an Impactor can forge a piece faster than can a conventional forging hammer.

Conventional methods of hot rolling, since they require multiple passes of the work through the rolls, likewise expose the work to high temperatures for undesirably long periods of time and have been examined for some method of speeding up the process. One solution is a new-type of mill called a planetary hot mill developed by Sendzimir. It rolls a slab to final hot-strip gage in one pass on a single stand. The mill consists basically of two driven backup rolls surrounded by a cluster of small work rolls

Fig. 5—Tiny "whiskers" are metals in perfect condition—with no imperfections. These "whiskers" are used by scientists to check modern theories of interatomic forces.

held in a spring-loaded cage to keep them against the backup roll. The slab is fed through a furnace and the feed rolls drive it into the mill where the small work rolls, traveling at relatively high speed, in effect take a number of small passes to reduce the slab to final gage as it leaves on the delivery side. It is possible to roll a 2 to 3-inch thick slab down to 100 to 150 mils thick, the normal hot-strip range, in one pass with very little change in temperature if the process be properly controlled.

But these measures are only stopgap methods and do not solve the basic problem of how to hot-work materials without any contamination from air. This would require that the heating, forging, and rolling equipment be located in a room where air can be excluded. Fantastic as it sounds, this is being done, on a rather sizeable scale at that, by one concern under a government contract. Since leaks would make it very difficult to keep the room un-

"A furnace is now being designed to simultaneously braze and heat treat an entire honeycomb airplane wing under vacuum . . ."

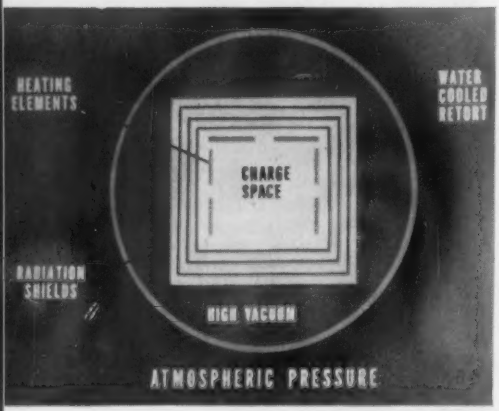


Fig. 6—The theory of the Kold Retort vacuum-treating furnace is simple. Surround the heating elements with reflecting baffle plates that concentrate heat on the work.

der vacuum, the alternative method of filling it with an inert gas, such as argon, is employed, and the operators don "space suits" with their own oxygen supply in order to move about in the room and run the equipment. An interesting sidelight is the fact that originally it was planned to have the operators wear a plastic bubble helmet with oxygen supply but simple calculations soon demonstrated that the perspiration from their bodies would contaminate the atmosphere with enough water vapor that serious contamination of the metal being worked might result. As a result, it is necessary that they be fully clothed in special suits so that neither water vapor nor their exhaled air can enter the room in any way whatsoever.

Another major concern is in heat treating, where in the last few years, commercially practical vacuum furnaces have been developed. The simplest type, the hot retort furnace, consists of a steel chamber containing the work, placed in a furnace and continuously evacuated by pumping. However, there is a serious limitation to this method, since at higher heat-treating temperatures, the chamber becomes so weak that it is apt to collapse when evacuated. A vastly improved approach was the development of the Westinghouse Kold Retort furnace consisting of a steel outer shell which remains cold and forms the evacuated chamber, as shown in Fig. 6. Within this chamber, metal baffles are arranged so as to act as heat reflectors in place of the normal refractory insulation in conventional furnaces. Inside the last baffle are placed resistance-heating elements which can be conventional alloys such as nichrome, or for higher temperature applications — molybdenum or graphite. The charge is placed inside the area lined by these heating elements and the heat is concentrated upon the work by the reflecting baffles. During the run the entire assembly is evacuated down to a pressure of about one millionth of an atmosphere. A furnace of this type is now being designed to simultaneously braze and heat treat an entire honeycomb airplane wing under vacuum, as portrayed in Fig. 7.

"It is vital that control devices be developed to operate at temperatures in the range of 500 to 1000 degrees F."

There are heat problems in magnetic materials, too. The control and guidance systems in missiles, which incidentally constitute the biggest part of missile development, are most often magnetic devices of one kind or another. Normally, magnetic devices such as servomechanisms, relays, magnetic amplifiers, and the like, operate around room temperature. A high-operating temperature for these devices would be 300 degrees F. But in missiles, due to aerodynamic heating, not only does the skin temperature go far above 300 degrees F., but the inner parts get hot too. In fact, as the speeds of missiles have been gradually increased, their interior temperatures have gone so high that it is now necessary in some cases to actually air condition the compartment that houses the guidance system. A small room air conditioner has to be included to keep control devices down to a temperature at which they can properly function. But as speeds become even greater, this air conditioner is seriously detracting from the pay load and will soon become prohibitive in weight.

It is vital, therefore, that control devices and the magnetic materials which they require, be developed to operate at temperatures in the range of 500 to 1000 degrees F. This is a serious challenge that has only recently begun to attract sufficient attention. Many of the present-day magnetic materials become nonmagnetic in this temperature range and, of course, would then be useless. In a very few years new alloys must be developed with much higher Curie temperatures (that is the temperature at which the alloy becomes nonmagnetic) if we are to develop the higher speed missiles that are now on the drawing boards.

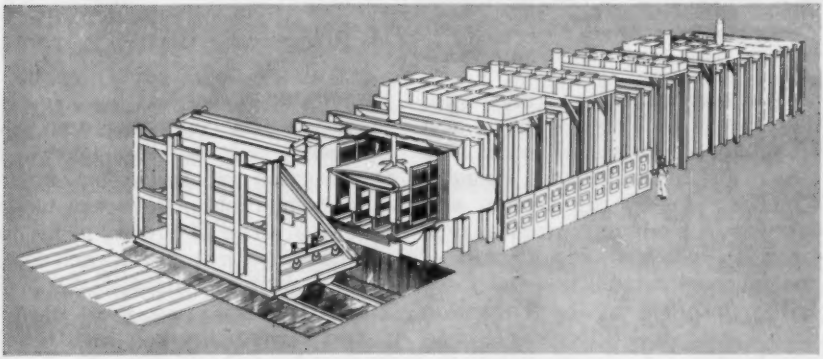
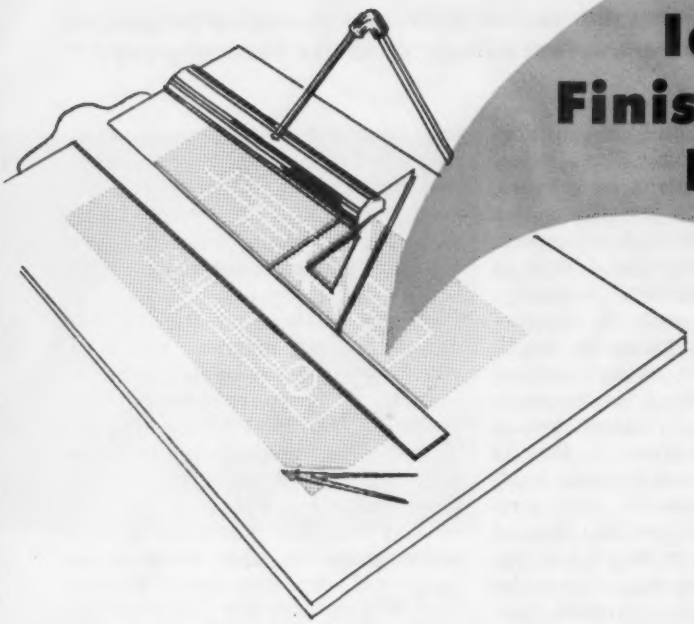


Fig. 7—Huge Kold Retort vacuum furnace being designed to braze complete aircraft wing.

Idea to Finished Product



This story answers some of the questions which arise for the company that looks around for manufacturing facilities to help build a product.

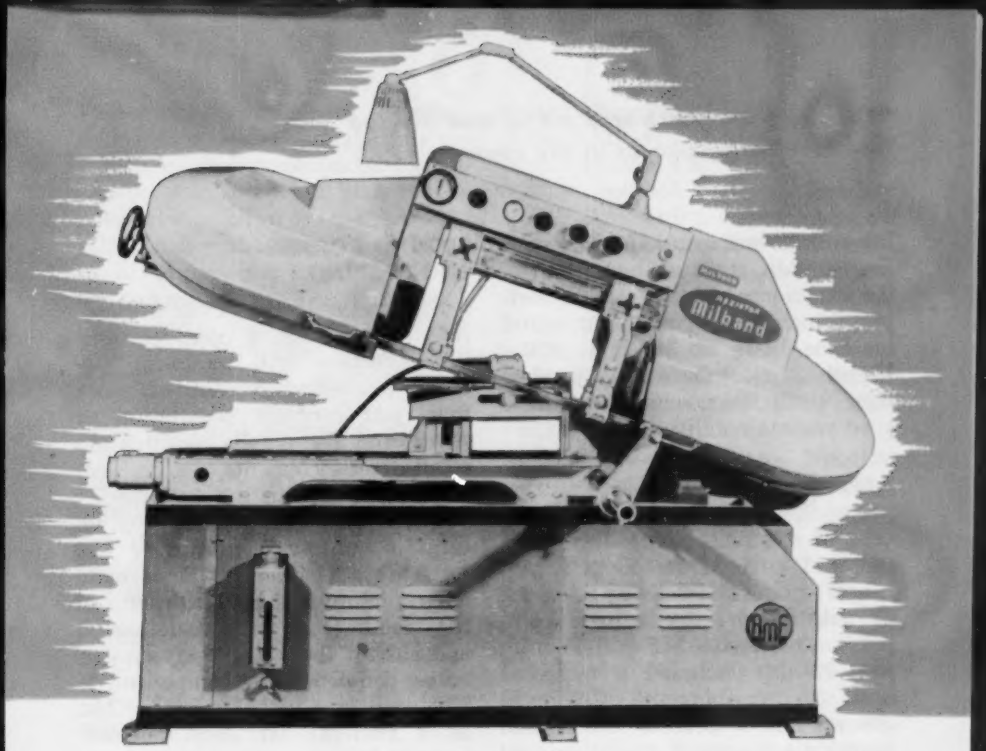
By ROGER J. KUHNS

Manager, Contract Products Group, Brooklyn Plant, American Machine and Foundry Company

Approximately a year ago, The Henry G. Thompson and Son Company contracted with the American Machine and Foundry Company to design, develop and fabricate a modern, horizontal type band saw which would utilize all of the inherent capabilities and flexibility embodied in the Thompson high-speed steel "Rezistor" band saw blade.

From the outset, it became apparent that the closest possible cooperation and communication was necessary to insure the success of the program and to develop a machine compatible with the saw blade and vice versa. It proved to be an ideal arrangement in that each company contributed its full share of knowledge, and their areas of experience complemented each other to round-out the picture.

In this program AMF wore only



The Milford Rezistor Milband is specially designed and constructed to utilize the heavy feeds and high blade feeds of which high speed steel band saw blades are capable.

one hat—that of a supplier, however it was a complex hat having four corners.

FIRST CORNER—MARKETING

First, it was necessary to define the marketing problem; i.e., what does the consumer want; what can be realistically attained within the present knowledge of the art; and how will the program be financed?

After considerable discussion along these lines, Thompson and AMF engineers drafted a set of performance specifications for the machine. Thompson felt that it must have a wide range of speeds; i.e., 40 to 360 blade feet per minute, or a 1:9 ratio. Second, because of floor loading problems, the machine must be rugged and yet weigh no more than approximately 3,000 pounds. Third, it must conform to the very best in modern machinery practices and yet be a unit that could be priced competitively. Fourth, it must be of modern design, completely functional and finished in accordance with the latest concepts of human engineering and color dynamics. Fifth, it must be capable of cutting metals up to 10 inches by 10 inches. Sixth, it must be engineered for economical and ready

"The program which was set up was divided into four major phases in the contract . . ."

integration with optional accessories. Seventh, it must embody all of the experience gained from an earlier 6-inch "Milband" cutting-off machine built in the late 1920's. Eighth, it must be readily producible. Ninth, the machine must have good maintainability.

Based on these considerations AMF prepared a detailed contract proposal, including an artist's concept of the finished product. This proposal covered initial pricing, future pricing and delivery patterns, as well as agreements to no-competition between AMF and Thompson. It also included a technical brochure describing the machine in general and a detailed description covering sequence of operation, major parts, feed table characteristics, power characteristics, control automatic panel, interlocking and safety control devices vise mechanism, location of parts, and a description of optional equipment. In short, the scope of the work was described in terms of performance characteristics rather than physical dimensions.

Further agreements were made regarding the ownership of special tooling, subcontracting, method of dealing with customer-requested changes, patent liabilities and licenses, guarantees, and terms of payment. The program which was finally set up was divided into four major phases in the contract, dealing with the prototype machine as well as follow-on lots of machines.

SECOND CORNER— ENGINEERING

Statements in the "First Corner" refer to engineering considerations in connection with marketing, because marketing embodies more than just contract negotiation at AMF, and also entails coordination of all diverse elements of a problem when dealing with the customer.

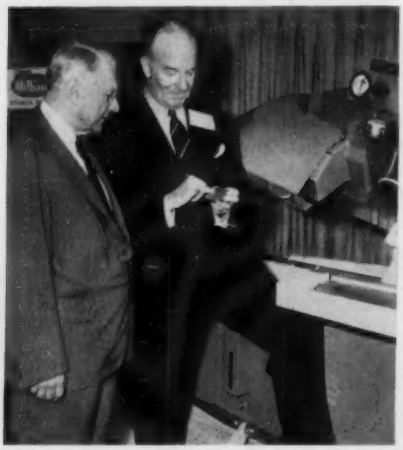
The next job to be done after receipt of contractual authority was for AMF's Engineering Division to make preliminary layout designs of the machines as they visualized it and submit these at weekly conferences, component by component, to Thompson's Chief Engineer, Mr. M. J. Radecki. Mr. John Passalacqua, senior engineer, was assigned as product engineer. He selected those items which had the longest lead time for design and fabrication for the first layout and proceeded in inverse chronological order until he had laid out the areas with the shortest lead time. He and Mr. Radecki then reviewed these layouts, and customer approval was obtained for proceeding with detailing.

After layout drawings were approved, the more detailed design of the components was completed. These designs were always within the perimeters established by engineering calculations. After complete design and detailing, Mr. Radecki was again requested to approve all the detailed component drawings. During all of this evaluation, Mr.

Passalacqua maintained a project notebook which enumerated all the principles that were under consideration and included sketches of novel ideas, and so on; and, periodically, this notebook was reviewed by his supervisor, to protect AMF on patent issues. These notebook pages were then duplicated and periodically forwarded to the patent counsel for review in connection with their functions, which comprise the third corner of the hat. After all detailing had been completed and the AMF Patent Department had given clearance on the design, prototype fabrication was started by the Manufacturing Division.

THIRD CORNER— PATENT REVIEW

To expedite this program and minimize any trial and error occasioned by potential patent infringement, AMF agreed to supervise the patent search, which was made by outside counsel. Mr. J. Bradley Cohn, a patent attorney, was assigned the responsibility of overseeing all patent aspects of this particular program.



(Left) D. W. Northup, President, The Henry G. Thompson and Son Company, and (right) Morehead Patterson, President and Chairman, American Machine and Foundry Company.

The first phase was a general search of the state of the art specifically concentrating on potential competitors' machinery. This information was then conveyed to the designers and detailers, and the specific patent claims which must be avoided were enumerated by internal briefings.

As a second phase, patent counsel was furnished copies of the engineering project book, and was later furnished with briefings on the detail drawings of the various subassemblies as they became established. The patent counsel then advised whether there was danger of patent infringement and paid particular attention to novel features. The state of the art relating to these features was studied in many areas of patentable knowledge not confined to mechanical saws. Where potential infringements were found, a report of this was made to Thompson and AMF engineers, and reasonable alternatives were found. In the event that AMF had found a substantial question of infringement which could not be resolved, the project could contractually have been terminated.

Upon completion of this interplay between patent searching and engineering design, the American Machine and Foundry Company issued a final patent report to the H. G. Thompson and Son Company,

indicating that no substantial question of infringement remained.

FOURTH CORNER—PRODUCTION

After final release of all engineering drawings, production was started on the actual "hardware." In a plant such as the AMF Brooklyn Works, employing two to three thousand persons and encompassing a tremendous variety of departments, it is necessary that a personal interest be taken in such a fast-moving program as this when it initially commences. This personal interest was forthcoming at the outset by the Divisional Vice President for Manufacturing, Mr. T. R. Dreyer, and his staff.

During the final stages of production on the initial machine, the respective heads of the two firms — Mr. Morehead Patterson, President and Board Chairman of AMF, and Mr. D. W. Northup, President of H. G. Thompson—met to discuss progress and future planning. As a direct result of this meeting, Messrs. Northup and Patterson jointly introduced this unit to the press and public on completion of the fabrication; the Project Engineer returned to "the scene" to supervise final tests prior to shipment. Just as we rounded the fourth corner, we again retraced our steps to the marketing problem, wherein Thompson and AMF personnel took advertising photographs of the machine in preparation for literature and publications which Thompson will institute in connection with its final marketing of the new band machine.

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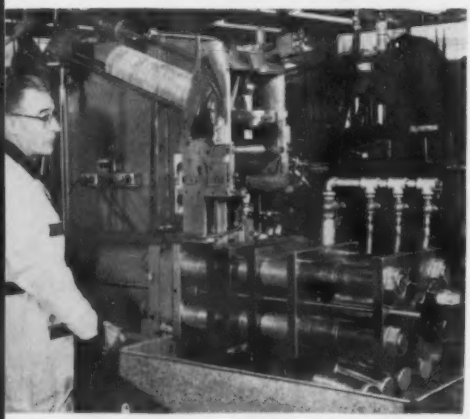
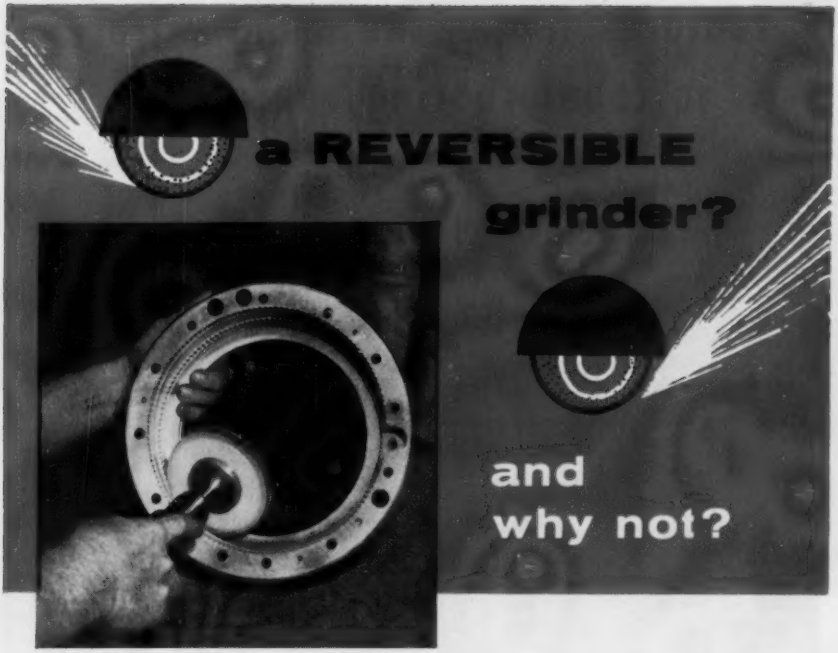
New Technique for Producing Aluminum Cans



Unique press developed by Kaiser Aluminum for producing seamless aluminum cans.

Aluminum cans with seamless one-piece bodies are being produced commercially by Kaiser Aluminum and Chemical Corporation. The press shown herewith forms the can bodies by drawing discs of aluminum sheet through cupping, ironing and bottoming dies automatically in a single stroke of the punch of the press.

Developed by Kaiser Aluminum over a two-year period, the press may be operated simultaneously from both ends. Discs are fed into the press from above. Seamless can bodies with a depth of up to three times their diameter can be produced in a single stroke, it is claimed.



Both edges of the numerous splines in this pitch lock housing must be carefully deburred. The shape of the part prevents working from both ends, so an ordinary single-direction grinder just won't do. So—you simply use a Buckeye *reversible* grinder. Start the job with a grinding wheel, switch to a stainless steel wire brush, then finish up with a tampico brush—and use the same Buckeye tool all the way.

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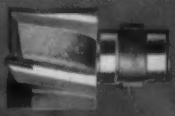
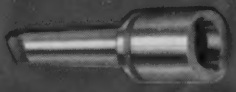
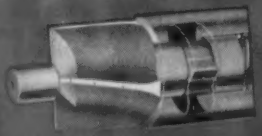


4. BALANCED DRIVE . . . *double* lugs on the cutter engage *double* abutments in the holder to form a single, rugged tool.

2. RIGHT OR LEFT HAND . . . lock or release either right or left-hand cutters quickly, easily, simply.



5. FREE FROM OBSTRUCTIONS . . . slips easily into a bushing or can be threaded for stop nuts or collars or fluted to remove chips.



3. EXTRA TORSIONAL RIGIDITY . . . drive lugs are close to seating shoulder of cutter for powerful, smooth operation.

6. PRACTICALLY INDESTRUCTIBLE . . . no binding, no shearing—driving forces apply compression.

These are the features that make the difference in counterbores—*six reasons why no one has ever reported failure of a Continental Counterbore Drive!*

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Machining Stainless Steel

A case history concerning the turning of a 17-4 PH stainless steel part.

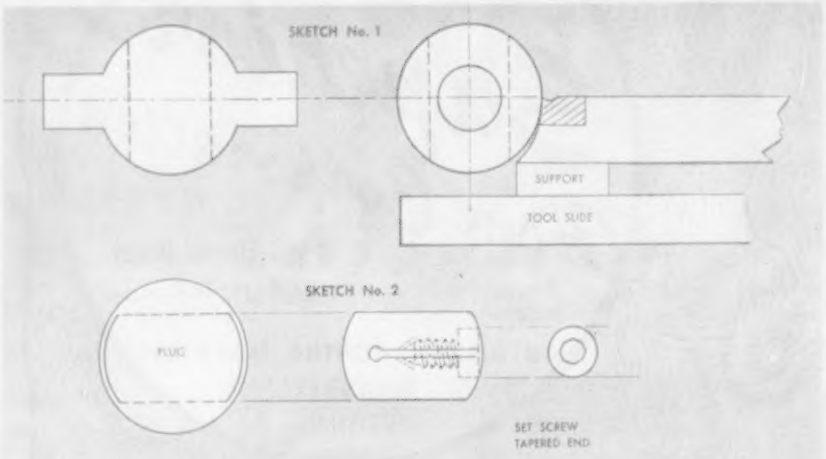
By G. J. STEVENS
Machining Engineer, Armco Steel Corporation

This discussion involves a fuel control valve made of 17-4 PH stainless steel. Size range was ¾ to 2½-inch rounds.

The part was being rough and finished turned in the hardened condition on an engine lathe. A special radius fixture was used to finish turn a spherical shape. A large hole through the center of the sphere caused rapid wear of the carbide cutting tool due to the interrupted cut action.

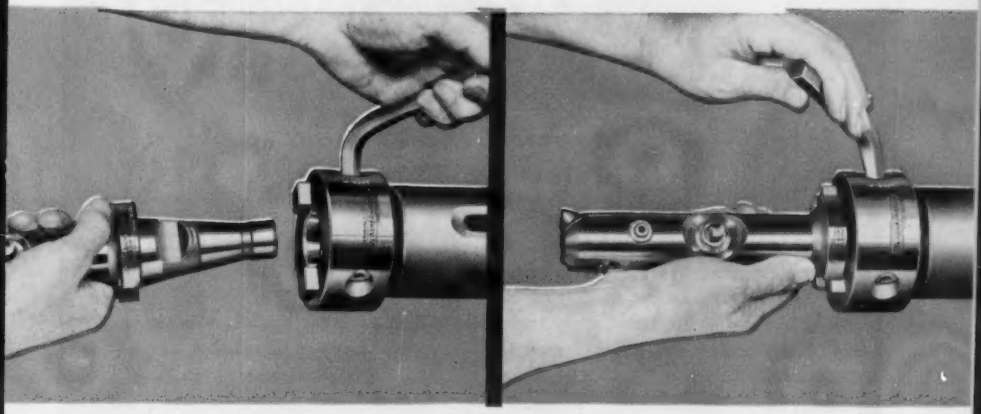
After fully studying the problem, the machining consultant set forth the following recommendations:

1. Try a tougher grade of carbides with a sharp shear angle to reduce cutting pressures.
2. Use a larger type tool and tool support with a radical front clearance angle. (Sketch No. 1).
3. For large size parts insert an expansion type plug in hole to balance the part and reduce tool vibration and shock of impact cutting. The plug should be slightly smaller than the sphere in order to prevent being cut by the turning tool (Sketch No. 2).



(Above) Setup for machining 17-4 PH stainless steel fuel control valve. (Below) Expansion type plug for insertion in hole of workpiece to balance same and reduce tool vibration.

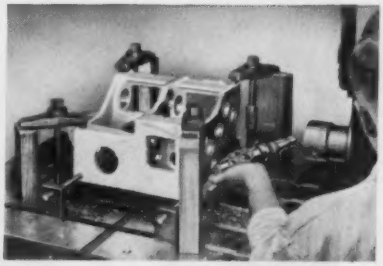
change tools in seconds!
retain exact diameter settings . . .



WITH MICROBORE FLASH-CHANGE SYSTEM!

Flash-Change permits a boring bar, set to a specific bore diameter, to be changed in seconds for other machining operations. Again and again, the bar can be quickly repositioned in the machine to accurately duplicate the original operation without further adjustment.

Flash-Change tooling includes a complete range of boring, drilling and milling equipment readily adaptable to any machine, or from one machine to another, by means of a simple Flash-Change Tool Holder with driving shank to suit the machine spindle. In addition to Flash-Change, the Microbore System includes a complete range of Standard Boring Bars. Special Cluster Bars can be furnished upon receipt of a part print and engineering data.



Shown is a cast iron gear box machined with Flash-Change tooling on a production basis. Production time substantially reduced. Bore diameters duplicated to extremely fine limits.

For complete information on a tool system that can greatly increase your production standards and profits, write for Catalog No. 57.

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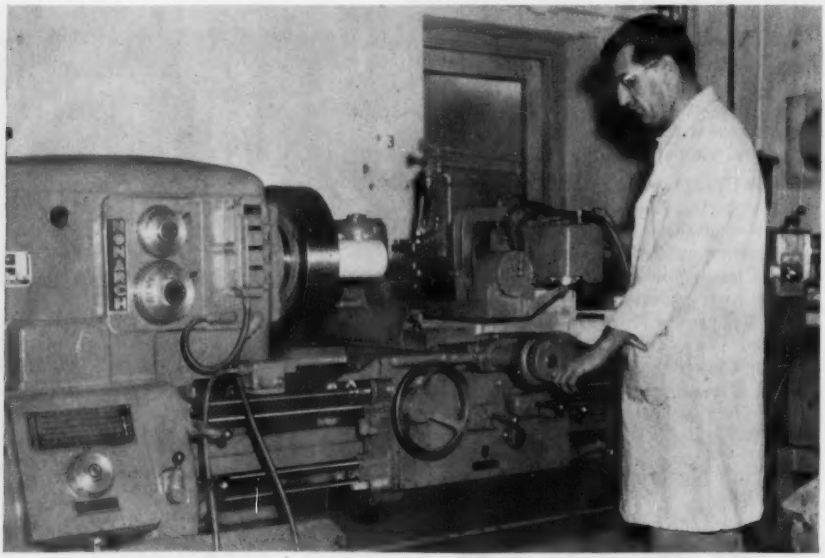
Machining Explosives

Remote control and TV team up to protect lathe operator.

Remote controls make it safe to machine explosives on a semi-automatic engine lathe in use at the U. S. Naval Ordnance Laboratory. One of several shop tools specially constructed for safe handling of explosives in the Chemistry Research Department, the lathe, teamed up with closed circuit TV, permits the operator to watch and control the progress of the work while on the other side of a two-foot thick concrete wall.

The control panel, twelve feet removed from the lathe, contains start, stop, reverse and feed controls. A feed meter located on the control panel makes feed settings positive and also provides a ready reference check on the setting.



Automatic remote control lathe being set up to machine explosives. After initial adjustment, the lathe will be safely operated by remote control and watched over a closed TV circuit.

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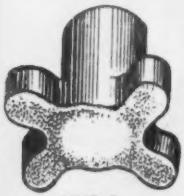

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Side to Center	1⅞	1⅞
Socket Drive	½ Sq.	⅝ Sq.
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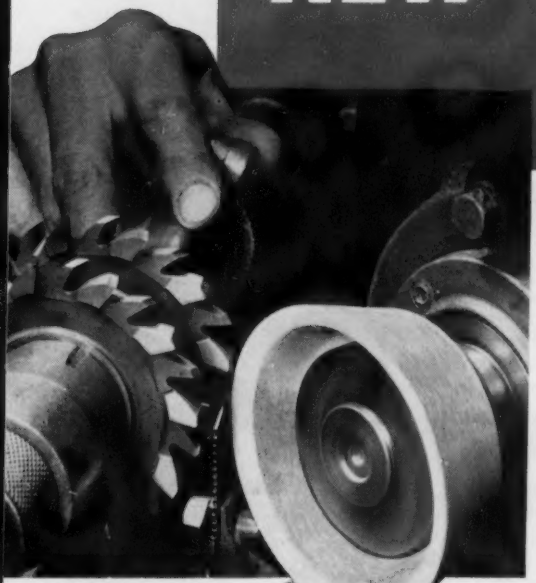

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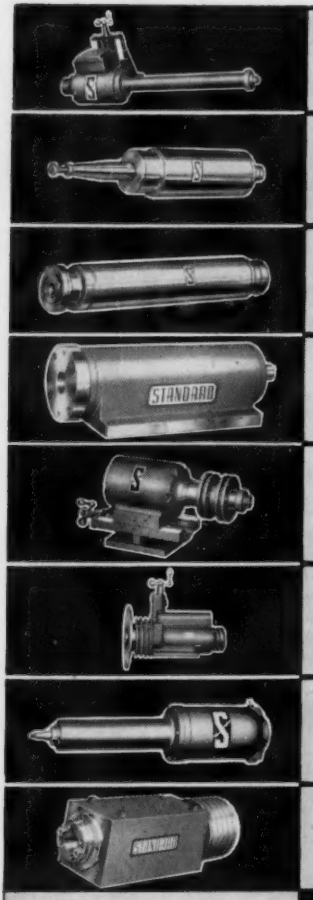

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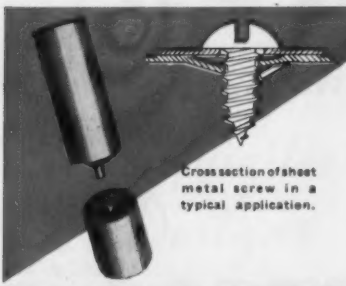

Cross section of sheet metal screw in a typical application.

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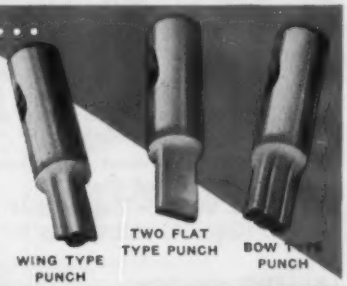

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TWO FLAT TYPE PUNCH

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R-B CLINCH NUT TOOLING . . .

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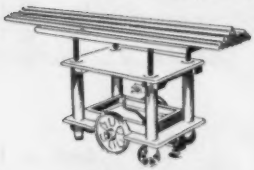

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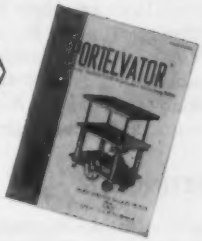

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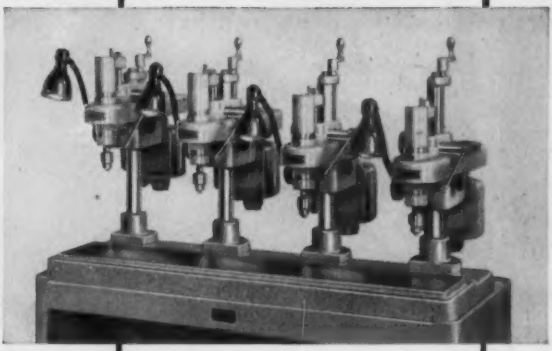

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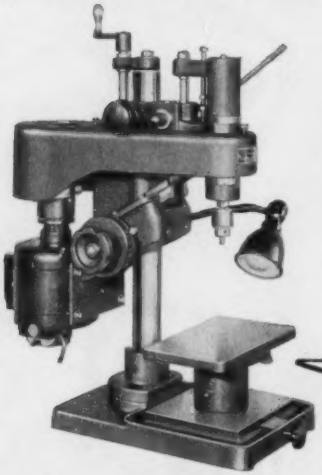

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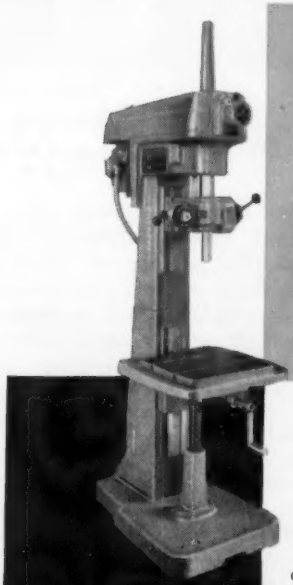

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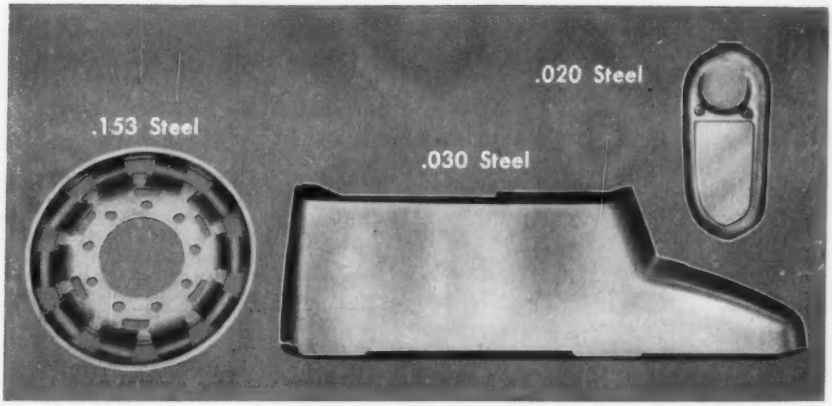

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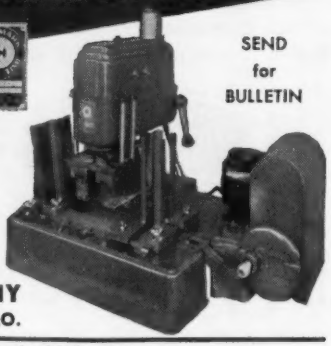

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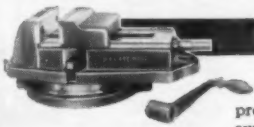

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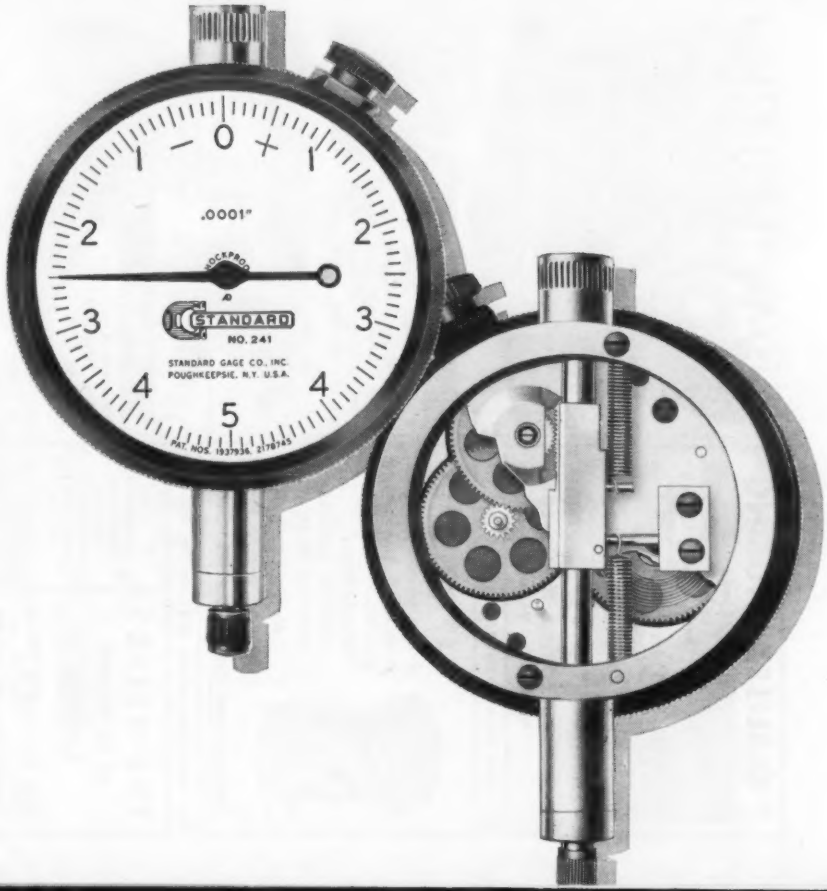

COMPARATIVE ANALYSIS OF SEVEN ESSENTIAL INDICATOR COMPONENTS

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COMPARATIVE ANALYSIS OF SEVEN ESSENTIAL INDICATOR COMPONENTS

	SPINDLE HARDNESS	PINION TEETH HARDNESS	PIVOT HARDNESS	BRONZE BEARINGS	REMOVABLE BEARINGS	SHOCKPROOF AT SPINDLE	SHOCKPROOF AT NO EXTRA COST
STANDARD GAGE	RC 59	RC 55	RC 55	YES	YES	YES	YES
MAKE A	RC 25	RC 55	RC 55	No	No	No	No
MAKE B	RC 25	RC 25	RC 25	No	No	No	No
MAKE C	RC 43	RC 43	RC 43	YES	YES	YES	No

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ideas from readers

ideas from readers

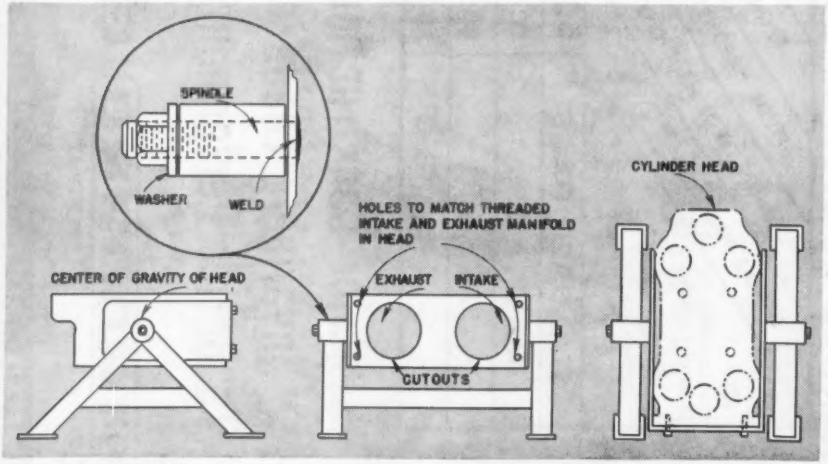
Several time-saving ideas and suggestions for the man in the machine shop.

Jig for Holding Diesel Heads

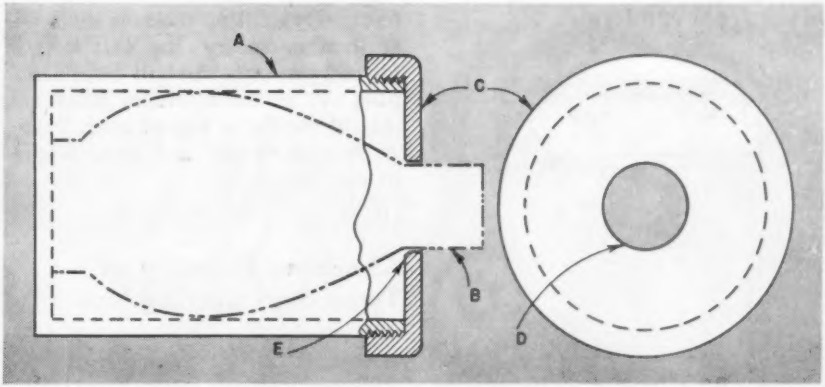
By J. A. BRUNSON

The accompanying sketch shows a jig designed for use in repairing diesel locomotive cylinder heads. The particular jig shown was devised by the writer for holding cylinder heads for 1,600 h.p. Baldwin-Lima-Hamilton diesel locomotives; however, this jig can be adapted to fit any diesel locomotive cylinder head.

We discovered that it was very difficult to work these cylinder heads over on the ordinary workbench; however, after making the jig and bolting the head in place on the jig, a single worker can readily turn the diesel head to any desired position and lock it in place for performing the work required.



Sketch showing side, rear and top views of jig for holding diesel locomotive cylinder heads



Sketch of box fixture designed for use in threading odd shaped or soft metal parts

Box Fixture for Lathe Chuck

By ROBERT HILL

We had a job that required threading the neck of several dozen aluminum bottle containers. The lathe operator was faced with the problem of making a fixture that would hold the container in the lathe chuck for threading. After several unsuccessful attempts at designing a proper fixture for the job, he came up with the box fixture, shown in the sketch, that held each container firmly without damage while the neck was threaded.

To make the fixture, the diameter and length of the container is measured and a section of cold rolled bar stock, *A*, is bored out to the length of the taper on the workpiece, *B*, so that a pressure cap, *C*, which is subsequently screwed on the end of the fixture, catches the starting taper at the neck and presses the container inside the box fixture. Thus, the workpiece stays in a fixed position. The cap is made from cold rolled steel and has a hole, *D*, in it slightly larger than the diameter of the bottleneck.

The inside edge of the hole is beveled, as shown at *E*, so that the pressure of the cap will not mar the surface around the neck. To allow a firm hand grip on the cap, the same is knurled. The container fits inside the fixture with about ¼ inch clearance.

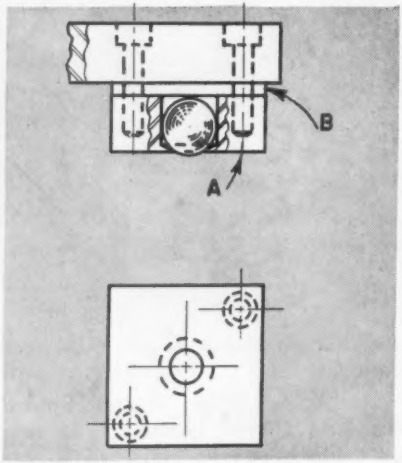
This box fixture can be used to hold other odd shaped workpieces, particularly tapered parts or those made of some soft alloy, such as copper, brass or aluminum.

★ ★ ★

Anti-Friction Drill Jig Feet

By FRED BARKER

When drill jigs have to be slid along the table of a multiple spindle drill press, the friction results in wearing of solid jig feet, as well



Sketch of anti-friction jig foot design.

as operator fatigue. Both of these conditions can be eliminated by installing in the jig, ball bearing feet of the type shown in the accompanying sketch.

Retaining block, *A*, which is attached to the jig by two screws, is provided with a drilled hole slightly larger in diameter than the ball bearing used, the hole being deep enough to allow the ball to roll freely. By drilling the hole no deeper than necessary, the seat that is formed prevents the ball from dropping out of the retaining block, *A*, should the jig be turned over. Plate, *B*, is a hardened and ground type of wear plate.

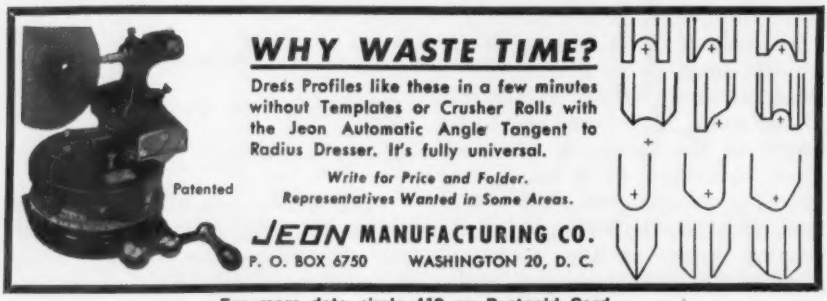
★ ★ ★

Checking Equality of Twist Drill Cutting Lips

By H. J. GERBER

In order to insure maximum efficiency and accuracy from a twist drill, it is important that the two lips of the drill point be exactly equal in length. This factor is of particular importance in performing deep-hole drilling operations.

For checking lip equality, we often make use of the inspection setup shown herewith after grinding a drill by the free-hand method. With this setup, the taper shank of the drill is held in the head spindle socket of an engine lathe. A hardened steel parallel or any convenient piece of mild steel bar stock that has been squared off on one end is gripped in the tool post of the lathe. The end of this check-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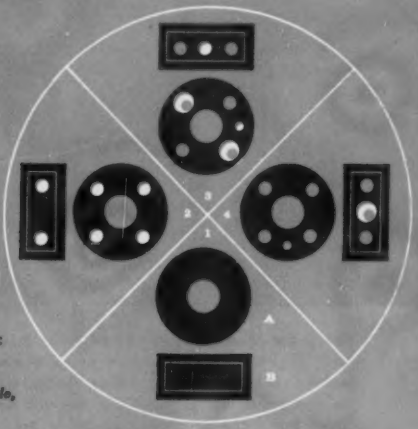
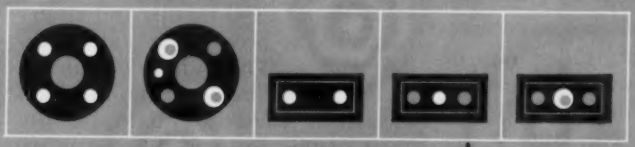
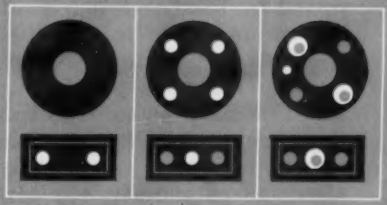
Multiple Drilling Operations on Two Part-faces



130 parts per hour—4-position rotary table. POSITION #1: *Unload finished part, transfer half-finished part, load new part.* POSITION #2: *Drill 4 holes, Face A. Drill and countersink 2 holes, Face B.* POSITION #3: *Drill 1 hole, ream 2 holes, Face A. Drill 1 hole, Face B.* POSITION #4: *Trepan 1 hole, Face B.*

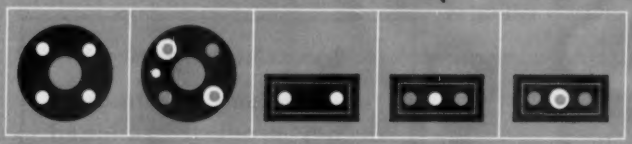


65 parts per hour—stationary fixture *with 5 work locations. Operator transfers parts after each stroke. One part completed per stroke.*



40 parts per hour—straight-line indexing. *After every 3 strokes, operator unloads finished part, transfers half-finished part and loads fresh part.*

23 parts per hour—tumble-type fixture. *Operator transfers and tumbles fixture from one position to the next. One part completed every five strokes.*



Standard multi-spindle Natcos range from 1 hp, 10-spindle machines to 50 hp machines with up to 72 spindles. Spindles in standard Natcos are driven through universal joints and located by either adjustable arms of bored slip plates

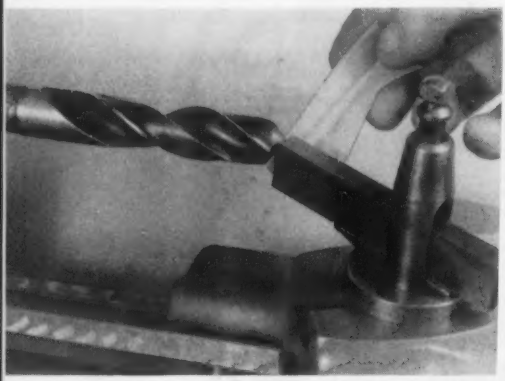
NATCO

National Automatic Tool Company, Inc.

Richmond, Indiana

Multi-spindle drilling, boring, facing & tapping machines. Special machines for automatic production.

Call Natco Offices in Chicago, Detroit, New York, Buffalo, Boston, Philadelphia, Cleveland, Los Angeles; distributors in other cities.



Setup for checking equality of twist drill lips. Drill is held in lathe head spindle and revolved by hand. Thin paper feeler is used to check contact of each lip against end of steel bar held at proper angle in tool post.

ing bar is brought against one of the two drill lips with just enough pressure to cut a thin paper feeler as the spindle of the lathe is revolved by hand. When contact has been made in this manner, the drill is revolved to bring the opposite lip into the same position. If the two lips have equal register with the paper feeler, the indication is that both lips protrude axially the same amount and are therefore equal in length. If one lip contacts the checking bar before the other lip, this first lip must have additional material ground off of it.

★ ★ ★

Centrifugal and Axial Flow Pumps. By A. J. Stepanoff. Second Edition. Published by John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 462 pages. Price, $12.00.

Revised and expanded to exemplify the extensive changes in theory, design and applications, this book now appears in a second edition. The increase of pump sizes and speeds has led the author to add a new chapter entitled "Water-Hammer Problems in Centrifugal Pump Systems." He supplies recent information in the chapter dealing with centrifugal-jet pump systems and has expanded the problem of the shut-off head for axial and mixed flow problems. Also extended are the principles of suction sump design for vertical propellor pumps.

Dr. Stepanoff's revision includes a modern viscosity correction chart, new complete characteristics of mixed flow and axial pumps and an account of the progress in water storage pumps. The author introduces a thermal cavitation criterion which correlates cavitation data on the basis of physical and thermal properties of liquids. Among the further fresh material are charts relating to impeller design for any discharge angle, a procedure to select the casing design elements to suit impellers and an improved method for the inlet velocity triangle construction.

More Information?

For additional information on any product mentioned in this issue, please use the READER SERVICE CARDS opposite pages 32 and 324.

Call Natco Offices in Chicago, Detroit, New York, Buffalo, Boston, Philadelphia, Cleveland, Los Angeles; distributors in other cities.

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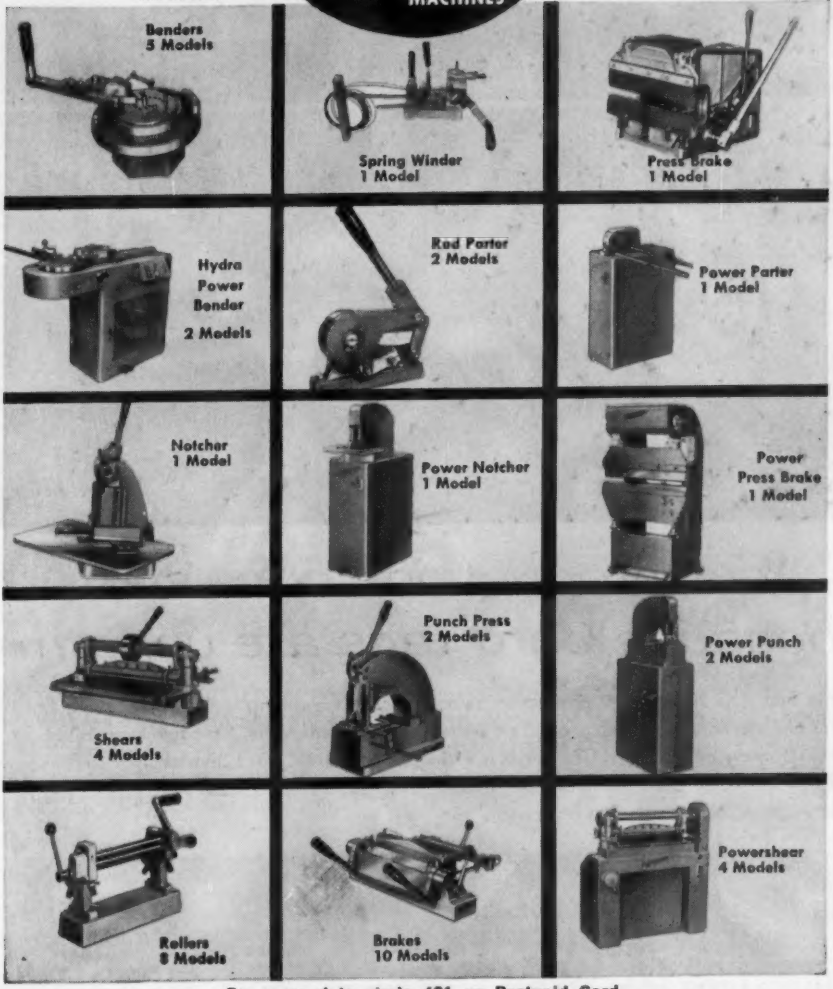

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new literature

new literature

Use Postpaid Cards opposite page 32 and inside back cover for requesting free copies of literature listed below.

1. Diamond Tools and Wheels
A.I.T. Diamond Tool Co., 8221 N. Kimball Ave., Skokie, Ill. This brochure gives the technical outline on the correct applications of diamond wheels. Resin and metal bonded (Al-Aloid Bond) diamond impregnated wheels. The combination of these two bonds can cover jobs required by industries which use Diamond Impregnated wheels.

2. Diamond Products
Allstate Diamond Products, Inc., 245 W. 27th St., New York 1, N. Y. A 32-page brochure giving complete line of diamond wheels, hones and dressers and also specifications and prices.

3. Stainless Steel
Armco Steel Corp., Product Information Service, Middletown, Ohio. Information available on properties and applications of 17-4 PH and 17-7 PH stainless steels.

4. Mechanical Tubing
The Babcock and Wilcox Co., Tubular Products Division, Beaver Falls, Pa. Advantages offered by the use of electric resistance welded mechanical tubing. Detailed information on the mechanical properties and various size tolerances to which ERW tubing is normally produced.

5. Surface Grinders
The Blanchard Machine Co., 64 State St., Cambridge 39, Mass. Blanchard automatic surface grinders are built in a wide range of sizes—from single spindle No. 16A with 30 inch diameter work table to 5 spindle No. 22A5 with 88 inch diameter with work table.

6. Machinery Mounts
Barry Controls, Inc., 783 Pleasant St., Watertown 72, Mass. Case history on use of Barry machinery mounts in connection with involute gear checkers.

7. Die Springs
E. W. Bliss Co., Cleveland, Ohio. A catalog classifying die springs in 500 standard sizes and three distinct pressure groups for each size, and includes full specifications and prices on all of Dieco's packaged spring assortments.

8. Ovens
Blue M Electric Co., 138th and Chatham St., Blue Island, Ill. An illustrated 48-page catalog covering the complete line of electric ovens, furnaces, Magniwhirl water and oil baths, environmental cabinets and controlled temperature equipment for the laboratory, medical field, pilot plant and production. Photographs and condensed specifications are included for standard equipment, giving size, temperature ranges, voltages, and capacities. Sizes are from less than 1 cubic foot to 96 cubic feet and temperature range covered is from 32 degrees F. to 2,850 degrees F.

9. Cutter and Accessories
Brown and Sharpe Manufacturing Co., Providence, R. I. A 96-page catalog covers the entire line of metal cutting tools, as well as arbors, adapters, collets, vises, index plates, work driving dogs, taper mandrels, expansion bushings and spring chucks. Listed are over 200 new items, including a new line of ball-end mills, both double-end and extended lengths, and an additional line of shell end mill arbors and so on.

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10. Turret Drills
Burg Tool Manufacturing Co., Inc., 15001 S. Figueroa St., Gardena, Calif. Current data on Burgmaster Models 2BH and 3BH Automatic Hydraulic Turret Drills. On Model 3BH, any combination of 8 operations can be performed in one set-up, and on Model 2BH, any combination of 6 operations.

11. Abrasive Products
The Carborundum Co., Niagara Falls, N. Y. "Toolroom Grinding of Alloy, High-Speed and Die Steels" featuring aluminum oxide abrasives, properties and use, wheel shapes and markings, broaches, chasers, cutters, circular form tools and hobs, offhand grinding, tap sharpening, tool post grinders, drill sharpening, cutoff and slotting.

12. O-Rings
Chicago Rawhide Manufacturing Co., 1301 Elston Ave., Chicago 22, Ill. A full range of C/R Industrial O-Rings in standard sizes and compounds. Standard O-Rings keyed to the new uniform numbering system in accordance with SAE Aeronautical Recommended Practice 568, cross-referenced to sizes in the 6227, 6230 and 6290 series are listed. Also, C/R compounds formulated for a broad range of industrial purposes, together with hardness ratings, compatibility and temperature ranges.

13. Drill Grinding
Cincinnati Lathe and Tool Co., 3207 Disney St., Cincinnati 9, Ohio. The spiral point concept in drill point geometry and the Spiropoint Drill Sharpener for applying it to standard twist drills are described and illustrated in a 16-page brochure.

14. Cutters
Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Calif. M3 type high speed steel enables holes to be made in all types of tough machineable metals, including alloy steels.

15. Taps
Detroit Tap and Tool Co., 8615 E. Eight Mile Rd., Warren, Mich. "What Do You Mean 'Specific' Taps?" A 20-page booklet telling how to get longer tap life and better performance when tapping different materials such as tough steels, cast iron, aluminum, zinc, brass, and plastics. This booklet is illustrated with typical applications for each material.

16. Sockets, Collets, Sleeves
The Collis Co., Dept. A, Clinton, Iowa. A 20-page catalog illustrating and describing drill sockets, drill sleeves, cutter bars, chucks and collets, taper sleeves, lathe centers, sockets and arbors, lathe bushings, and pipe centers.

17. Dust Collecting Equipment
Colonial Blower Co., 54 Lewis St., Plainville, Conn. A 28-page catalog on industrial ventilating and dust collecting equipment and a complete line of collector accessories.

18. Die Set
Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50, Ill. Tolerances on the intricate shaft-mounted spring die set are plus 0.003 inch, minus 0.000 inch.

19. Hand Screw Machine
Delta Power Tool Division, Rockwell Manufacturing Co., 478 N. Lexington Ave., Pittsburgh 8, Pa. Delta hand screw machine features a bed turret with six stations, and the standard Delta 11-inch metal lathe which may be converted into a hand screw machine by the addition of accessories. The tool bridges the production gap between the standard engine lathe and the expensive automatic screw machine.

20. Flame Heating Machines
The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. Cincinnati Flamatic Precision Selective Flame Heating Machines are designed for heat processing applications requiring either high or low heating capacity, selective application of heat, precise temperature control and automatic operation. They are suited to a wide range of precision heat processing applications including spin hardening, spot hardening, progressive hardening, combination hardening, tempering, annealing and brazing.

21. Flamecutting Nozzles
Linde Co., Division of Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y. A 12-page folder on Oxweld flamecutting nozzles describes and illustrates some of the production steps that go into the manufacture of Oxweld cutting nozzles, and also how precision workmanship at the factory in the production of cutting nozzles assures dependable performance and efficient operation on the job.

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22. Lifter
Economy Engineering Co., 4507 W. Lake St., Chicago 24, Ill. 2,000 pound capacity Type DX Shoplifter equipped with floor lock, hoist unit, platform lift, platform plate and so on.

23. Drill Press
The Electro-Mechano Co., 265 East Erie St., Milwaukee 2, Wis. The 16-inch drill press offers an infinitely variable speed range from a low 150 r.p.m. and any speed up to 4,000 r.p.m., without the use of special attachments. Precision helical back gears supply the low speeds, down to 150 r.p.m., for spotfacing, tapping, reaming and drilling with increased power and a minimum of belt slippage. A production type table with a lifting mechanism and multiple head floor type base has been added to the toolroom drill press line.

24. Magnetic Base Tools
Enco Manufacturing Co., 4520 W. Fullerton, Chicago 39, Ill. Complete line of turret tool posts, bed turrets and tailstock turrets and offset clamp rod supplied with Models 150 and 160 to hold lugback indicators.

25. Circular Bending Machine
Excelsior Tool and Machine Co., 31st and Ridge Ave., East St. Louis, Ill. Reversible circular bending machine rolls part or complete circles of angles, flats, pipes, rounds, squares, tees, channels, beams and special shapes.

26. Grinding and Boring Spindles
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Precision grinding and boring spindles are illustrated and described in an 8-page brochure showing practical applications. Standard spindles for use as original equipment by machinery builders or as replacement spindles to improve the performance of grinders and boring machines in use are also described.

27. OBI Presses
Ferracute Machine Co., Bridgeton, N. J. Made of high-tensile semi-steel casting. Employs all the up-to-date proven features in gap frame construction including heavily reinforced throat, extra-heavy crown, rigid cross-ties between upright sections, and main bearings split at 45 degree angle.

28. Testing Surface Plate Flatness
Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill. A method of measuring flatness for recording and charting deviations on surface plates, machine beds, ways and other surfaces is based upon the use of the Microptic Testgraph on which readings of the Microptic Auto-Collimeter are experssed in topographic curves. This method and application is explained and illustrated in a bulletin No. T-757 entitled "Testing Surface Flatness."

29. Electronic Test Indicator
Federal Products Corp., 1144 Eddy St., Providence 1, R. I., The Electro-Probe Electronic Test Indicator, a completely portable dimensional test instrument and the Sure-Set, an electronic table positioning device for universal grinders, are fully described in a 4-page brochure.

30. Carbide Technical Manual
Firth Sterling, Inc., 3113 Forbes St., Pittsburgh 30, Pa. The manufacture and physical properties of tungsten carbide, Firthite grade selection and application, the use of single point tools, and recommended Firthite cutting speeds are featured in this catalog.

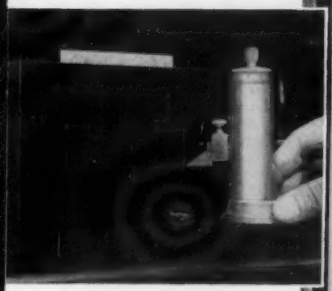
31. Countersinks
M. A. Ford Co., Davenport, Iowa. A bulletin on H.S.S. and Carbide Uniflute Countersinks includes specifications and prices, and a description of a method to re-sharpen the tools in your own shop.

32. Machine Mounting Specifications
Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio. "Machine Mounting Specifications for Abrasive Discs and Plate Mounted Wheels." The material covered in this brochure includes location and size of bolt holes in steel disc wheels and the mounting side of abrasive discs and plate mounted wheels. Definitions and standard sizes are listed for abrasive discs in the inserted nut, inserted washer, tapped mounting plate types, projecting stud type and cylindrical type.

33. Boring Mill and Lathe
Index Industrial Corp., 150 Broadway, New York 38, N. Y. A series of catalogs covering the Wotan Horizontal Boring Mill and the Mondiale Celtic Lathe.

GREIST MICRO-HEIGHT® "4"

increased range gives new model 5" direct capacity



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34. Cold Headed Fasteners
John Hassall, Inc., Westbury, L. I., N. Y. Handbook on the design and use of such cold headed specialties as rivets, nails, screws, and other fasteners and small parts. Data includes cost and design advantages and manufacturing possibilities plus information on metals and finishes.

35. Surface Grinder
Harig Manufacturing Corp., 5765 W. Howard St., Chicago 31, Ill. The TML 6 by 12 inch precision surface grinder has a transverse carriage which slides on broad vee and flat bed ways lubricated by oil cups. It is operated by a 5 pitch screw for rapid travel and mounted in two grease sealed ball bearings that eliminate all end play. 6 inch hand wheel is graduated to read thousandths.

36. Rotary Boring Tool
Jancy Engineering Co., 508 S. Pine St., Davenport, Iowa. A concentric and practically burr-less hole is drilled in quarter-inch hot rolled steel with 1-5/16 inch Rotor-Bor. A 4-lipped tool, now available in sizes from ¾ inch to 2-1/32 inch.

37. Indexing Trunnions
Johnson and Bassett, Inc., 110 Foster St., Worcester, Mass. An 8-page catalog illustrating and describing the speed and convenience of the indexing trunnions in drilling, tapping and counterboring of a typical machine housing. Complete specifications are listed on all trunnion models, as well as on the adaptors.

38. Turret Lathes
Jones and Lamson Machine Co., 521 Clinton St., Springfield, Vt. 24-page catalog describing and illustrating turret lathes, thread and form grinders, optical comparators, boring machines and so on.

39. Filing Machine
Newage Industries, Inc., 222 York Rd., Jenkintown, Pa. The Rindis Bench Model Filing and Trimming Machine can be used for continuous, powerful cutting on all materials which have to be filed, trimmed or deburred. Easy operation, no special skill is required, cuts without heat, abrasives, or coolant, surfaces are filed perfectly flat, speed and disc changes can be made quickly.

40. Double Angle Shears
Kling Brothers Engineering Works, 1320 North Kostner Ave., Chicago 51, Ill. All of the sizes of Kling Double Angle Shears with special attachments to meet specific requirements.

41. Tube-Piercing Machine
Koppy Tool and Die Co., 1530 Farrow Ave., Ferndale 20, Mich. Standard models AA and AB pierce tubing up to 3 inches in diameter. The Koppy AA head pierces two round or rectangular holes at maximum overall distance of 2¾ inches or cuts a slot up to 2¾ inches in length. The Koppy AB head extends maximum cutting distance to 4½ inches.

42. Drill Press Vise
L-W Chuck Co., 28 S. St. Clair St., Toledo 4, Ohio. Adjusto quick control 4 inch drill press vise and fixture holder has heavy 4 inch wide removable jaw inserts which allow simple, quick adaptation for jigs and fixtures. Has 5½ inch opening. Easy hand pressure on hardened and micro-ground bar locks and holds the work fast.

43. Hydraulic Presses
Lake Erie Machinery Corp., 1002 Woodward Ave., Buffalo 17, N. Y. Bulletin describing and illustrating specific applications, giving general press specifications, of four column, single action hydraulic presses in the various forms of metalworking — including high tonnage drawing and forming, die quench forming, stretch forming, rubber pad forming, deep drawing, steel forging, aluminum forging, heavy plate binding and working, straightening, coining and bushing.

44. Double Enveloping Worm Gearing
Michigan Tool Co., Cone-Drive Gears Division, 7171 E. McNichols Rd., Detroit 12, Mich. 24-page brochure with information on the design and application of double-enveloping worm gearing. This brochure contains engineering formulae and step-by-step instructions for using them in designing and applying Cone-Drive gearing to drives of all types.

45. Positioning Vise
Lassy Tool Co., Plainville, Conn., Illustrated literature on the Lassy Slide Lock Instant Positioning Vise complete with specifications and prices.

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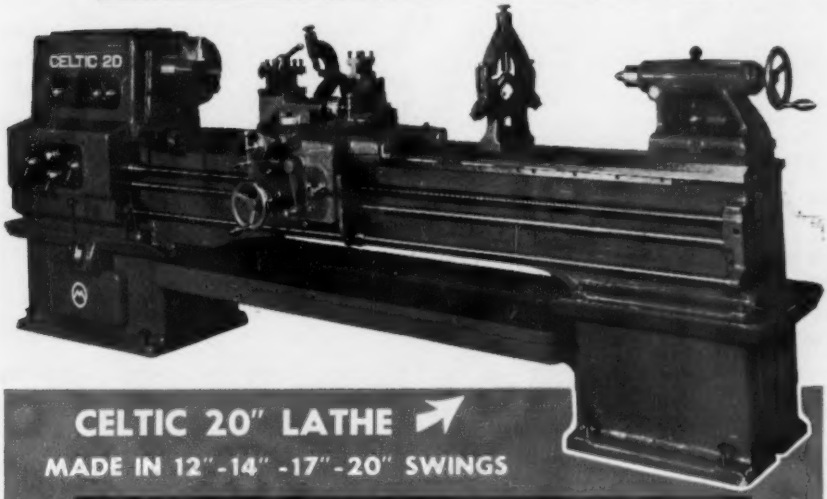
QUALITY • PRECISION • DEPENDABILITY

OVER 30,000 MONDIALE LATHES ARE IN USE THROUGHOUT THE WORLD



CELTIC 20" LATHE

MADE IN 12"-14"-17"-20" SWINGS

OUTSTANDING FEATURES:

Precision hardened and ground spindle • Standard taper key-drive spindle nose • Hardened and ground gears and shafts • Equipped with anti-friction bearings • Automatic built-in safety devices prevent simultaneous engagement of the lead screw and feeds • Helical gears in the apron assures smooth and silent operation • Removable gap affording extra capacity at no additional charge • Splash lubrication • Direct Vee-belt drive between motor, gearbox and headstock results in smooth and fine finishes • High spindle speeds.

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46. Hollow Spindle Lathes
Lehmann-Brandes Machine Co., Chouteau at Grand, St. Louis 3, Mo. Hollow spindle hydra-trol lathes provide a complete range of sizes with spindle holes from 3½ to 19½ inch diameter, larger holes upon request. These lathes incorporate such features as rugged bed, carriage, tailstock, power and sturdiness.

47. Arcwelder
The Lincoln Electric Co., Dept. 3516, Cleveland 17, Ohio. The Lincwelder 100 makes welds in mild steel with Selfweld or with coated electrodes. This arcwelder handles Lincoln Planeweld 2, Fleetweld 180. It also welds cast iron with Lincoln Ferroweld electrodes, as well as cutting and heating metals.

48. Grinding Wheels
Simonds Worden White Co., 1101 Negley Place, Dayton 7, Ohio. A 16-page bulletin describing its wide range of vitrified and resinoid grinding wheels. Of particular interest is a detailed breakdown showing the ideal abrasive, bond and specification marking recommended for a long lift of different types of metals and classes of work to be ground. These wheels are available in standard sizes and shapes or can be readily engineered to meet specific application and materials requirements.

49. Coolant Applicator
Mechanical Appliance Co., Dept. MS, 1111 N. Franklin St., Chicago, Ill. No maintenance — automatically operates from quill—and adjustable coolant discharge tube, are two of the features of the "Squirt" coolant applicator.

50. Clutches
The Minster Machine Co., Minster, Ohio. 16-page folder discusses the features of a Minster Air Friction Clutch and Brake for reconditioning and modernizing existing mechanical presses. Clutch control data and the physical inventory of equipment used in a Minster clutch conversion are listed in this folder.

51. Cutting-Off Machines
Modern Machine Tool Co., 2005 Losey Ave., Jackson, Mich. 12-page catalog describing and illustrating cutting-off machines and automatic loaders, also hot spinning machines and safety drill tables.

52. Tungsten Carbide Surfacing
Kennametal, Inc., Latrobe, Pa. "Kenplate Tungsten Carbide Surfacing" is the title of a 4-page bulletin describing a product used in protecting metal parts against abrasion and wear, and application methods. Kenplate consists of small hexagonal carbide buttons assembled on a flexible backing material for bonding metal surfaces.

53. Wheel Approach Control
Landis Tool Co., Waynesboro, Pa. A 4-page bulletin describes how the wheel approach control speeds the grinding cycle on Landis cylindrical grinders when work with large variations in stock have to be ground.

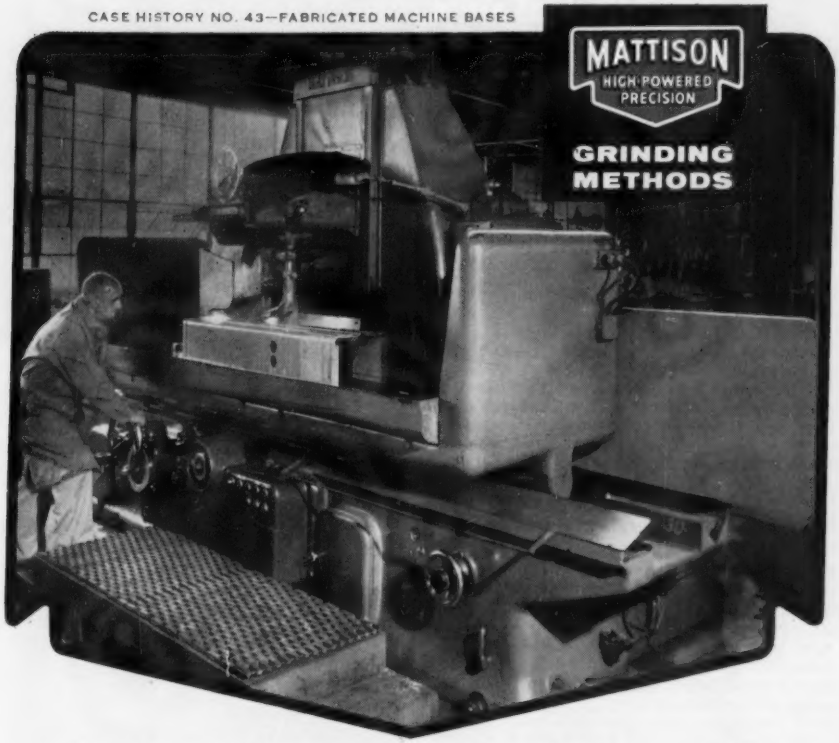
54. Adhesive Bonding Machines
Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 38, Mich. A full line of machines for assembling parts of various materials by adhesive bonding is described in a 6-page booklet. The machines, in all models, feature positive control over all bonding factors. In addition, it discusses optional instrumentation and a line of cold-assembly presses that complement the bonding machines.

55. Lathe Spindle Speed Selector
The Lodge and Shipley Co., 3058 Colerain Ave., Cincinnati 25, Ohio. The Powershift Preselecter has all of the construction features of Lodge and Shipley Powerturn Lathes, in addition to a single dial for spindle speed changes, elimination of all speed change levers, up to 6 selected spindle speeds programmer on selector dial and so on.

56. OBI Press
The Oliver Corp., A. B. Farquhar Division, 128 N. Duke St., York, Pa. Features and specification details for the 75, 100, 150 and 200-Ton Capacity Oliver-Farquhar OBI Mechanical Gap Presses are available in a 4-page illustrated catalog.

57. Grooving Machines
Niagara Machine and Tool Works, 683 Northland Ave., Buffalo 11, N. Y. Giant Power Grooving Machines, modernized and equipped with pushbutton controls and gearhead motor drive. Full details and specifications for this machine as well as for Universal and Hand Operated Groovers are included.

CASE HISTORY NO. 43—FABRICATED MACHINE BASES

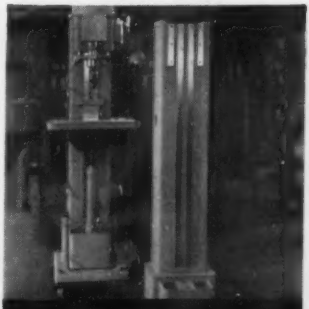


Machine bases made faster, better... with switch to steel fabrication and surface grinding!

"Our Mattison surface grinder accelerates production by 100%, improves accuracy, reduces wheel dressing 700%, facilitates assembly, maintains better finish, increases wheel width, eliminates chatter, and helps retain product quality without price increases," says Mr. Herman Goldberg, president of the Snow Manufacturing Company.

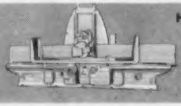
The grinder was part of a program which involved switching from cast iron to fabricated steel bases and replacement of milling with grinding. Now, this company is converted to steel fabrication in 98% of its operations.

Vitally important to precision of their machines is accurate grinding of the 59-inch-long channels on the vertical main frames. All surfaces are ground to limits of plus or minus .005 in., and flatness is held to .0015 in. Parallelism of dovetail assemblies is held to .0005 in.



Flatness of 59-inch-long channels is held to .0015-inch over entire length.

MATTISON MACHINE WORKS ROCKFORD, ILL. U.S.A.



HIGH-POWERED PRECISION SURFACE GRINDERS

For more data circle 426 on Postpaid Card

58. Marking Machine
New Method Steel Stamps, Inc., 147 Jos-Campau St., Detroit 7, Mich. Numerical control of production parts in automated production assembly lines through the use of an automatic marking machine is described in a 2-page bulletin. This is a special machine built for consecutive marking of serial numbers on engine cylinder blocks and the unique toggle linkage design used to control impression depth.

59. Single Point Tools
The O K Tool Co., Inc., Milford, N. H. There are catalogs of O K's full line of: inserted cutters, in high speed, cobalt, V-5 and carbide tipped, high speed solid standard and special milling cutters and end mills, shank and shankless high speed, cobalt V-5 and carbide single point tools, forged tee bolts and forged flange nuts. Also miscellaneous literature such as grinding manuals for cutters, and so on.

60. Grinder Millers
Precise Products Corp., Racine, Wis. Super 30—45,000 r.p.m. and 1/5 h.p. on ac/dc in a precision multi-purpose tool weighing only 35 ounces. One-piece precision-ground quill. Hardened ground and honed draw type collet reduces diameter at nose to only ½ inch allowing full visibility and complete accuracy over work area. One hex wrench speeds and simplifies chucking.

61. Jaw Drill Chuck
Oneida Machine Tool Corp., 700 E. Walnut St., Oneida, N. Y. One-inch capacity Westcott "Little Giant" heavy-duty 2-jaw drill chuck has vise-like grip, to hold true and firm and not injure the shank of the drill.

62. Metal Sawing Machines
Peerless Machine Co., Racine, Wis. Handi-Cut, Speed-Cut and High Speed Band Saw metal cutting machines are described and illustrated in a series of bulletins giving specifications and so on.

63. Self Cleaning Collet
Sheffer Collet Co., Traverse City, Mich. A 24-page catalog giving dimensions on the company's complete line of standard collets, pushers, pads and accessories.

64. Precision Measuring
Opto-Metric Tools, Inc., 137 MM-10 Varick St., New York 13, N. Y. Fundamentals and essentials of precision measuring and inspection is now available in bulletin which discusses the differences between optical and mechanical inspection instruments and will aid the inspector in selecting the proper instrument for the inspection work to be performed.

65. Arbors and Collet Chucks
Pope Machinery Corp., Haverhill, Mass. Complete dimensional data on the Interchangeable Extension Arbors and Tapered Shank Collet Chucks for internal grinding spindles and milling spindles. 250 styles and sizes of Extension Arbors are listed and described. Also are the Pope Self-Removing Wheel Holders for all types and makes of tool and cutter grinders, vertical, cylindrical and surface grinders.

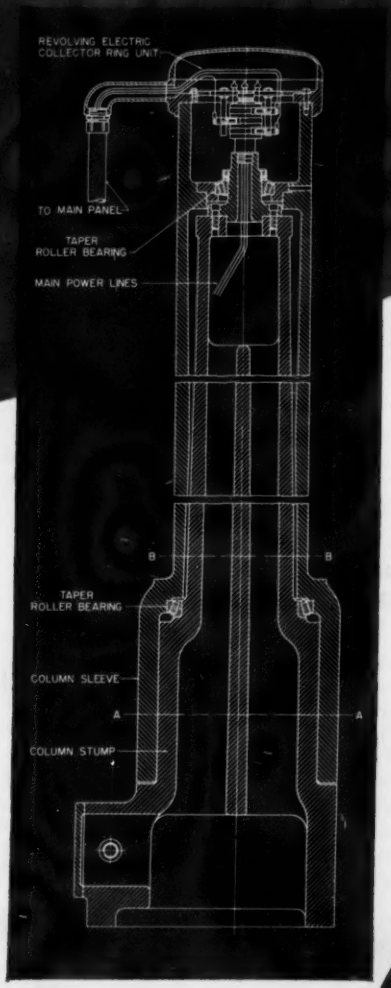
66. Plain Rotary Table
Pratt and Whitney Co., Inc., 25 Charter Oak Blvd., West Hartford, Conn. The 42 inch plain rotary table is equipped with numerical control. Data supplied by punched tape on keyboard is translated into highly accurate mechanical positioning. Work is automatically positioned to any desired angle.

67. Press Welders
The Precision Welder and Flexopress Corp., 3520 Ibsen Ave., Cincinnati 9, Ohio. 6-page bulletin on Precision Spot and Projection Press Welders. Listed are the specifications for the entire line which includes resistance welders from 30 to 600 KVA, 1275 to 18,000 lbs., electrode forces, 12 inch to 30 inch throat depth.

68. Thread Rolling Attachments
Reed Rolled Thread Die Co., Worcester 1, Mass. Bulletins containing engineering data pertaining to the application of the Reed Model B8 Thread Rolling Attachments for various automatic screw machines.

69. Locators
Speedgrip Chuck, Division of Ernest, Holdeman and Collet, Inc., Elkhart, Ind. Speedgrip expanding locators are guaranteed to repeat fixture location of a true work part within 0.0002 inch t.i.r. and they assure loading ease.

Rigidity Increased 50%



New thrust resistant, "TIMKEN" mounted column and sleeve assembly.

The new "TIMKEN" mounting of the column and sleeve on the new model 32-speed Hole Wizard Radial has hit the "jack-pot" for rigidity. It's the stiffest, most resistant column unit we've ever known.

Under drilling tests up to 30 horse power deflection has been cut in half over former models. It's truly a marvel of rigidity.

Large Timken bearings at top and bottom when preloaded bind the column and sleeve into the equivalent of a solid unit for resisting functional stresses and cuts arm deflection to an absolute minimum. This definitely results in greater accuracy and longer cutting tool life. To further increase resistance to stresses the column sleeve departs from conventional design by employing a tapered inner wall providing an unusually heavy section where the greatest functional stresses are concentrated.

A new "NON-CREEP" clamping mechanism in combination with a solid column sleeve cuff adds greatly to the rigidity of this new "AMERICAN" Radial.

Write for Bulletin No. 328 for the complete story of More and Better Work at Lower Cost.

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

news of the industry

news of the industry

Acquisitions and expansions . . . awards . . . meetings . . . new appointments.

Edited by R. M. SCHIFFER

N.T.D.M.A. ELECTS OFFICERS

At its annual meeting, the National Tool and Die Manufacturers Association elected the following officers for the coming year: Philip Marsilius, executive vice president of The Producto Machine Co., Bridgeport, Conn., president; Jack Kleinoder, secretary-treasurer of Volkert Stampings, Inc., Queens Village, N. Y., first vice president; Harold G. Murdock, vice president of Arrowsmith Tool and Die Corp., Los Angeles, Calif., second vice president; Robert C. Renner, president of The East Dayton Tool and Die Co., Dayton, Ohio, re-elected treasurer; and James A. Perdy, vice president of Atlantic Manufacturing Co., Philadelphia, Pa., secretary. Executive vice president George S. Eaton and assistant secretary Charles R. Bender will continue in their respective capacities.

★ ★ ★

BURGMASTER CORPORATION OPENS NEW PLANT

Burgmaster Corp., Small Tool Division, Burg Tool Manufacturing Co., Inc., Gardena, Calif., has announced the opening of a new plant at 13226 South Figueroa St., Gardena. Mr. F. G. Burg, president of the company, states that this particular plant's facilities will be devoted to large scale production of the new, sensitive, 3/16 inch capacity Burgmaster Bench Model Drilling and Tapping Turret Drill.

Above are pictured the newly appointed N.T.D.M.A. officers: (from left to right) Philip R. Marsilius, president; Jack Kleinoder, first vice president; Harold G. Murdock, second vice president; Robert C. Renner, treasurer; and James A. Perdy, secretary.

SEALOL ACQUIRES ACRA-MENT LINE

The Sealol Corp., Providence 5, R. I., has announced the organization of its Acra-Ment Instrument Division, recently established to manufacture and market a complete line of precision Indicating Gages. This Acra-Ment Instrument Division of Sealol results from its recent acquisition of the Meyer Corporation's Indicating Gage line. The facilities of Sealol's Anchor Tool and Die Division will be utilized in the manufacture of these sensitive type indicating gage instruments.

★ ★ ★

C. E. SMITH ELECTED PRESIDENT OF S.C.I.

Clinton E. Smith, assistant to the general manager, Pratt and Whitney Company, Inc., West Hartford, Conn., has been elected president of the Solid Carbide Institute, a national organization with headquarters in New York and composed of 15 prominent industrial companies which manufacture solid carbide tools. Mr. Smith joined Pratt and Whitney in 1931 when the company purchased the Keller Mechanical Engineering Company of Brooklyn, New York, with whom Mr. Smith had been associated. He took part in integrating the operations of the Keller concern with those

C. E. Smith, president

You **KNOW** where the holes will be . . . with

UNIVERSAL ADJUSTABLE

U.S. Drill Heads

"Shot gun accuracy" is for the birds. With U. S. Heads you pin-point your multiple-hole drilling *exactly*—position the drilling spindles for different patterns almost as easily and quickly as you read them from your prints.

Style U-1L Universal Adjustable Head provides 9" diameter drilling area. U. S. Heads cover a wide range—6" to 15" diameter drilling areas, drill sizes up to 1-1/16". Totally-sealed, lifetime-lubricated universal joints can be interchanged quickly without tools.

Immediate delivery on most sizes. Write today for complete specification data in new catalog No. AD-57.

US DRILL HEAD

We manufacture all types of adjustable, fixed center and individual lead screw tapping heads.

UNITED STATES DRILL HEAD CO.

BURNS STREET • CINCINNATI 4, OHIO

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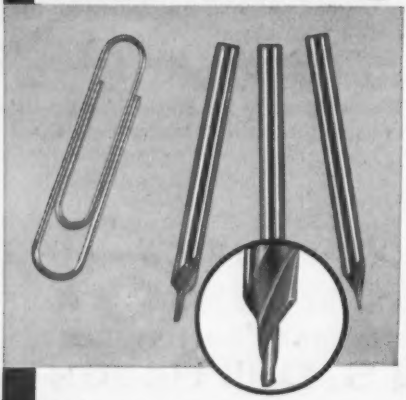
Miniature
END MILLS



Woodruff & Stokes now offers end mills in a variety of sizes up to 0.125-inch maximum. All end mills are two-flute, right-hand spiral, and will be ground to any desired diameter. These tools are made of M-2 type high speed steel. Perfect concentricity is maintained between shank and cutting diameters. The diameter of the cutting end can be held to a tolerance of ±.0001. Delivery approximately 2 to 4 days.

For complete information on the special tool design services of Woodruff & Stokes, write to:

WOODRUFF & STOKES CO.
INCORPORATED
Bldg. 32, 353 Lincoln St.
Hingham, Massachusetts

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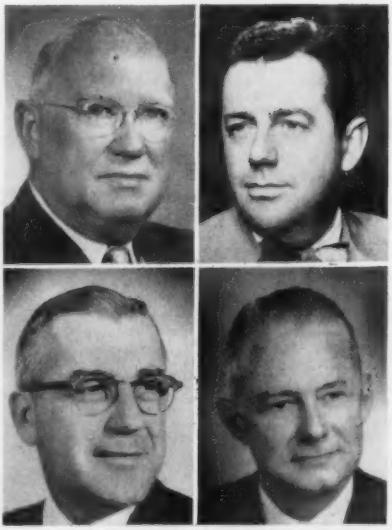
of The Pratt and Whitney Company.

The Institute is said to be responsible for a standardization program which governs the sizes and types of carbide tools. In addition, it is the regulatory body of a national research and educational program in the use of solid carbide tools.

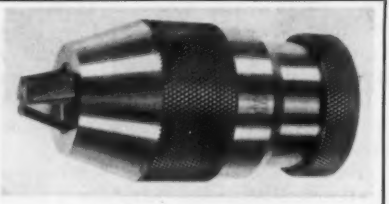
★ ★ ★

SOUTHEAST MACHINERY COMPANY FORMED

The formation of the Southeast Machinery Co., Fort Lauderdale, Fla., to meet the machine tool requirements of Florida's expanding manufacturing industries was announced by George



(Upper left) George Habicht, Jr., president; (upper right) E. L. Eveleth, vice president and general manager; (lower left) Richard W. Banfield, secretary; (lower right) Thomas R. Rudel, treasurer of Southeast Machinery.



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A Superior Swedish Drill Chuck
For the finest JIG BORERS
or other machines
WHEREVER UTMOST AVAILABLE ACCURACY COUNTS

- Automatic tightening and self centering with load
- Easy to open—**No Key** to misplace or to invite accidents
- No chewed up tool shanks
- All parts properly hardened and Precision Ground
- Arbors Precision Ground between centers

The Chuck of TODAY for the most demanding operators!

Sole U.S.A. Representatives
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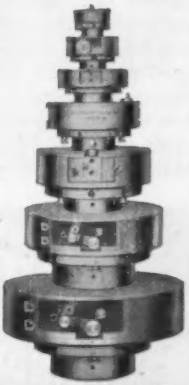
MUMMERT-DIXON FACINGHEADS

Two-way tool feed in 9, 12, 16, 20, 24. 30, 36, 40 and 46 sizes.

One-way tool feed in 6, 9 and 12 sizes. Automatic feed — convenient tool adjustment — quick feed reverse. Save time and costly set-ups.



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STERLING "G-2" with 25° Tilting Spindle for *FAST, ACCURATE* Tool & Cutter Grinding

The STERLING 25° Tilting Spindle provides faster set-ups, positive clearance angles, accurate grinding, extra capacity and versatility. Available in Plain and Universal Models.

Sharpen Drills 1/8" to 2 1/2", 90° to 140° Included Angle on ONE Drill Grinder

STERLING "DV" grinds drills accurately with pre-determined clearance and included angles, plus free cutting conical grind.

Ask your McDONOUGH Dealer or write for Bulletins

McDONOUGH MANUFACTURING CO.
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Habicht, Jr., president. Associated in the new organization along with Mr. Habicht, who is also chairman of the board of Marshall and Huschart Machinery Co., Chicago, Ill., are executives of two other machine tool distribution organizations. Richard W. Banfield, president of Motch and Merryweather Machinery Co., Cleveland, Ohio, and Thomas R. Rudel, president and chairman of the board of Rudel Machinery Co., Inc., New York, N. Y., are secretary and treasurer, respectively, of the new company.

Sales engineering and service operations of Southeast Machinery Company will be under the direction of E. L. Eveleth, vice president and general manager. Mr. Eveleth is a former engineering and manufacturing executive of United Aircraft Corporation, East Hartford, Conn. The company has begun operations at 1525 South Andrew Ave., Fort Lauderdale.

Southeast Machinery will represent the American SIP Corporation; Armstrong - Blum Manufacturing Company; The Avey Drilling Machine Company; The Blanchard Machine Company; E. W. Bliss Company; Chambersburg Engineering Company; The Cincinnati Bickford Division, Giddings and Lewis Machine Tool Company; George Gorton Machine Company; Gould and Eberhardt, Inc.; Kaukauna Machine and Foundry Division, Giddings and Lewis

MINUTES—NOT HOURS!
ACCURATE ANGULAR GRINDING SET-UPS
Set-up for grinding V-Block.
Set-up for grinding chamfer.
Set-up for grinding angle surface.
Magna-Lock
electro-magnetic
SINE CHUCKS
Single or compound angles. Easy to use. No dials, no scales. Standard gauge blocks insure utmost accuracy. Work held without distortion. Rugged, precision quality construction. Table of Constants furnished.
Magna-Lock
magnetic chucks and devices
Get details, DEPT. MM-18
MAGNA-LOCK, INC.
BIG RAPIDS, MICHIGAN, U. S. A
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The Leading Machine Tool Manufacturers use

RUTHMAN GUSHER

COOLANT PUMPS

THE RUTHMAN MACHINE CO.

Model UL 7120

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They're a MUST in every shop where many blows have to be struck without marring surfaces. Available with "SHUR-GRIP" drop forged handles.

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WALTER

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With & Without Dividing Discs

- READABILITY: 6 SECONDS.
- CONSTRUCTED FOR LONG LIFE.
- MAINTAIN PRECISION.
- AVAILABLE IN 10", 12½", 15¾", 19¾", 25", 31".

Also many types of **Universal Precision Dividing Heads and Attachments** for most economical production.

Test reports furnished with literature.

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NEISE MODERN TOOLS

KARL A. NEISE
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What is your CMD

LUBRICATING PROBLEM?

☐ **LATHE CENTER LUBRICATION**
SCORING-GALLING

☐ **GRINDING CENTERS**
LUBRICANT WASHOUT

☐ **DRAWING**
SCORE MARKS-DIE WEAR

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WORK PIECE DAMAGE

☐ **PRESS FITS**
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☐ **DIE POSTS**
WEAR-FREEZING

CMD Lube has solved many like it with excellent results. Perhaps CMD will be your answer, too!

CHECK AND SEND IN FOR SAMPLE

Anti-Scoring Lubricant

CHICAGO MANUFACTURING AND DISTRIBUTING CO.

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Machine Tool Company; The Motch and Merryweather Machinery Company; Oliver Instrument Company; The Oster Manufacturing Company; Sheldon Machine Company, Inc.; Societe Genevois D'Instruments De Physique; The Thompson Grinder Company; and The Torrington Company.

NEW NAME FOR WEST DISINFECTING COMPANY

The West Disinfecting Co., L. I., N. Y., has announced the change of its name to West Chemical Products, Inc. The name change was submitted by the firm's directors and approved by the stockholders.

The reason for this change is said to be caused by the increasing growth and diversification of West which has

Your hardness testing is no better than the penetrator

A FULL WILSON LINE
TO MEET EVERY HARDNESS
TESTING REQUIREMENT

FULLY AUTOMATIC
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SEMI-AUTOMATIC
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TUKON MICRO & MACRO HARDNESS TESTERS

Every WILSON *Diamond "*BRALE*" Penetrator gives you:*

a flawless diamond • no chips, no cracks
precise accuracy of penetrator angle

Microscopic inspection finds and rejects any diamond with the slightest imperfection... comparator check, with hundreds of magnifications, assures essential accuracy and uniformity of penetrator angle ... your complete assurance of—

Accurate measurements • No rejection of good parts
No keeping of sub-standard parts
No risking good name with customers

The matching accuracy of WILSON Diamond "BRALE" Penetrators and "ROCKWELL" Hardness Testers, insure perfect hardness testing... EVERY TIME.

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MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE
230-G Park Avenue, New York 17, N.Y.

For complete data write for Booklet **DH-327**

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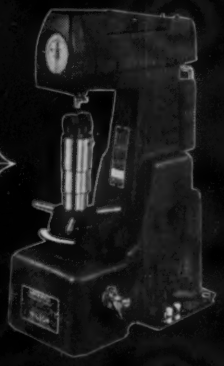
WILSON "ROCKWELL"—
THE WORLD'S STANDARD OF HARDNESS TESTING ACCURACY

WILSON "ROCKWELL"
HARDNESS TESTERS



A FULL WILSON LINE TO MEET EVERY HARDNESS TESTING REQUIREMENT

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SEMI-AUTOMATIC
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REGULAR
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SUPERFICIAL
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MICRO & MACRO HARDNESS TESTERS

When it's WILSON "ROCKWELL"-TESTED *you KNOW it's RIGHT!*

Easy to operate—all controls at hand. *Takes rough service*—maintains accuracy after years of operation.

Expert Wilson Service—helps you choose proper model...keeps it at work. A staff of WILSON hardness testing experts is available to provide quick emergency service if it is ever needed.

The booklets listed below give complete and helpful data on the indicated WILSON *equipment...*

DH-325 for "Rockwell" Regular
DH-326 for "Rockwell" Superficial
DH-327 for Accessories & Specials

ACCO **WILSON**
MECHANICAL INSTRUMENT DIVISION
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230-G Park Avenue, New York 17, N.Y.

Write for one or all of these booklets
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DH-326
DH-327

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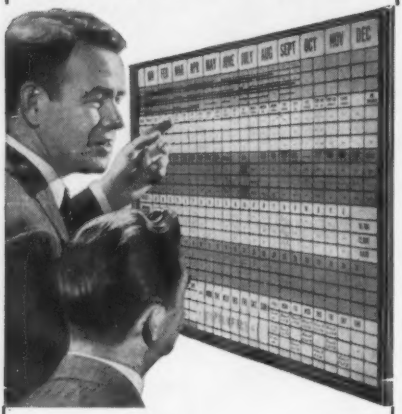
You Get Things Done With Boardmaster Visual Control



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GRAPHIC SYSTEMS

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made the original name too limited a reflection of the company's activities. Today, the company manufactures chemical specialties for protective sanitation and preventive maintenance. The new name not only describes the current organization, but also indicates its plans for future growth. The company's good will developed over the years will be retained by the continued use of its present name, West Disinfecting Company, in association with the new name and also as the division of an important segment of West Chemical Products, Inc.

West products include floor maintenance products, products for the control of industrial dermatitis, insecticides and other chemical specialties in addition to disinfectants, germicides and cleansers.

★ ★ ★

E. W. BLISS ANNOUNCES AMPOGRIP VISE ACQUISITION

A multi-fingered vise, which automatically adapts its grip to provide positive holding of irregular shaped pieces, has recently been added to the product line of the E. W. Bliss Co., Canton, Ohio. The vise, which will continue to be sold by Bliss under its present name, Ampogrip, was acquired from the American Positive Grip Vise Corp., Williamsett, Mass.

It is said that the vise can be used substantially in the same manner as conventional vises for holding rectangular shaped objects, but has the advantage of adjusting its contour gripping fingers automatically to conform to any irregular shaped object.

It is indicated that this is another step in the Bliss Company's program of diversification into lines compatible with its present products and facilities, but having a stabilizing influence on the company's business. It is possible

that it will be introduced to the home-workshop market, although specific plans for merchandising the vise are still being studied.

The E. W. Bliss Company is a builder of all types of metalworking presses, a supplier of rolling mills, rolls and similar equipment, can making machinery, die sets and die makers' supplies, aircraft launching and recovery equipment, special manufacturing equipment, contract work and other products.

★ ★ ★

GENERAL ELECTRIC INTRODUCES DISPOSABLE INSERTS IN NEW PACKAGE

General Electric Co., Metallurgical Products Department, Detroit, Mich., has announced that the line of Carboloy cemented carbide disposable inserts for toolholders is now available in a new package. A transparent plastic container with sliding cover of the same material houses several identical inserts. It is said that style and grade are clearly marked on the package and, since the number of inserts left is clearly visible, inventory is made easy.

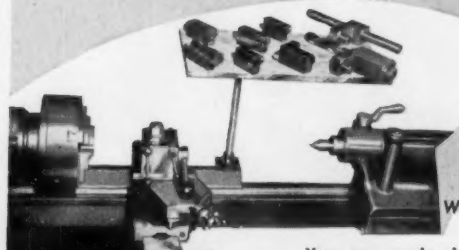
Triangular, square and round inserts are packaged in this manner.

★ ★ ★

AWARD AND SCHOLARSHIP DESIGN COMPETITION

The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio, has announced its annual mechanical and structural design competition which offers 46 cash awards to undergraduates. The top award is $1,250. The awards are made in two separate competitions, one for mechanical designs and one for structural designs. Open to undergraduates only, the competition offers awards for the best designs

NOW YOU CAN HAVE . . .



SPEED, ACCURACY, RIGIDITY, VERSATILITY, UNLIMITED OPERATIONS

WITH FRY MULTI-DUTY TOOLING SYSTEM

30 different types of Tool Adapters

11 different sizes of Tooling Systems

You can modernize your Lathe with a Fry Multi-Duty Tooling System at surprisingly low cost. Drill, Bore, Turn, Face, and perform precision tapping profitably.

Fry Tooling will provide:

• Unlimited operations in one chucking • Split second Adapter change with .0002" repeat accuracy • Lathe operation 80% of the time • Tool changing only when bits become dull • Double usefulness of your present Lathe.

Exclusive representation available in some localities

FRY TOOL MFG. CO.
EATON, OHIO

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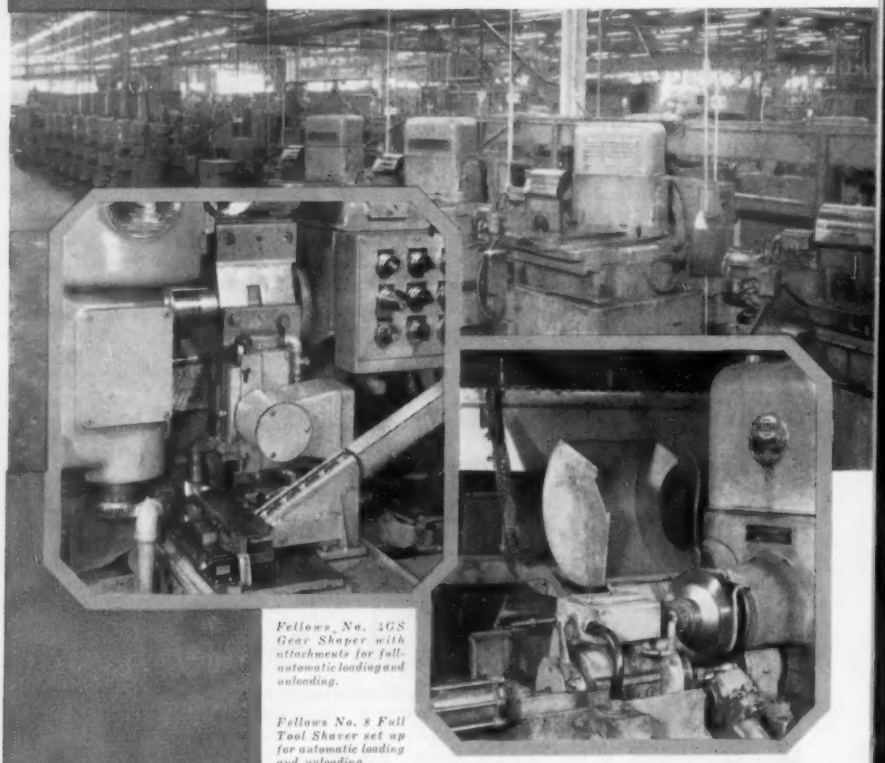
THE *FORWARD* LOOK...

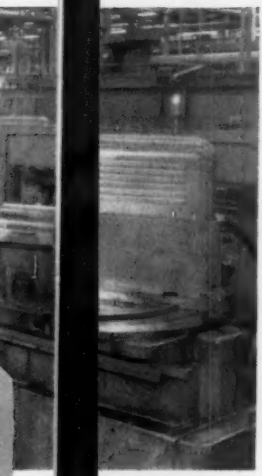


Fellows No. 4GS Gear Shaper with attachments for full-automatic loading and unloading.

Fellows No. 8 Full Tool Shaver set up for automatic loading and unloading.

THE PRECISION LINE

. . . in Chrysler's Fully-Automatic Gear Production Line



Fully-automatic shaping and shaving on Fellows machines: this is "*The Forward Look*" in gear production techniques, adding advanced speed and efficiency to pinion production for Chrysler Corporation automatic transmisions.

Cutting at a speed of 470 strokes per minute, each of 14 Fellows No. 4GS Gear Shapers rough cuts and finishes a 1.286" P. D. pinion in less than a minute. Parts are then automatically conveyed and loaded on Fellows No. 8 Full Tool Shavers for final finishing. Parts are automatically stock-piled in process to spread production evenly over machines.

These are the same versatile machines that many manufacturers use for manual production of short runs of gears and other shaped parts! Optional attachments provide any degree of automatic operation desired. Ask your Fellows Representative to show you facts and figures on the cost advantages of investment in modern Fellows machines. A 71-page booklet, "The No. 4GS Gear Shaper," describes and illustrates the machine in full detail, including attachments for automatic or semi-automatic operation. Write, wire, or phone any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 North Woodward Ave., Royal Oak, Michigan
150 West Pleasant Ave., Maywood, New Jersey
5835 West North Ave., Chicago 39, Illinois
6214 West Manchester Ave., Los Angeles 45

Fellows *Gear Production Equipment*

For more data circle 438 on Postpaid Card

Wash drawing showing laboratory addition, Michigan Chrome and Chemical Company

of a machine, machine part, structure or structural component which makes a significant use of welding. Designs made as a part of regular school work may be used. Entries may be submitted after graduation or the close of the school term. Rules are available from the company.

★ ★ ★

MICHIGAN CHROME AND CHEMICAL BREAK GROUND FOR LABORATORY ADDITION

Michigan Chrome and Chemical Co., Detroit, Mich., has announced the breaking of ground at the Grinnell Avenue plant in Detroit for the purpose of constructing a new 18,000 square foot laboratory addition.

It is said that the new quarters will provide laboratory facilities for both the Plating and Chemical Divisions of the company. Separate laboratories will be assigned to plating control, new products research, chemical products development as well as technical service.

Facilities will also be provided for a plating pilot plant, devoted to research and development of new plating techniques and processes; and a chemical pilot plant, which will assist in the commercialization of new de-

SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists and tool cribs

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes 3/32" to 1/2", by 1/64"—plus handy 17/32" size. Length 4 7/8". ONLY $17.90.

Single sizes available

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Operating Features

1. **HYDRAULIC FEED AND CONTROL SYSTEM**—Pressures are controlled by a single graduated dial. Rate of feed is controlled by a small throttling valve.
2. **SWIVEL VISE** — Quick-acting self-positioning type for cutting any angles up to 45°.
3. **BEARINGS**—Extra large bronze bushings accurately press fitted are used on all rotary shafts.
4. **AUTOMATIC KNOCK-OUT**—Saw frame automatically rises to its highest point and motor is stopped at the completion of each cut.

MODEL 816 UTILITY SAW

A fully automatic hydraulically operated all-purpose saw that will handle the full range of general cut-off work.

Any metal from tough tool steel to mild bars, tubing and structural shapes up to 8" x 16" can be cut with speed and precision.

No clutch, trains of gears, levers or ratchet devices are used. The Racine Model 816 is designed with a minimum of easily accessible precision-made working parts that assure years of dependable operation.

Write for catalog giving specifications on RACINE'S complete metal cutting saw line.

RACINE HYDRAULICS & MACHINERY, INC.

2070 Albert St., Racine, Wisconsin

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GRINDS
THEM ALL!
Radii, angles or tangents . . . straight or tapered flutes . . . square, radius or ball ends . . . this machine grinds practically any special or standard cutting tool quickly, accurately, economically. Learn how you can reduce tool costs, improve work quality, cut machining time – write for Circular No. S455-8.
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CUTTER and RADIUS
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news of the industry . . .

velopments in chemical research. The new building will also include an instrument laboratory, a library, a light equipment room and a conference room.

During the last year, the following personnel have been added to the laboratory staff: A. C. Lansing, as laboratory manager; Hans K. Neumann, as a research supervisor; R. A. Leger, C. P. Wolsli, B. Parsynski, H. G. Bates, Elfio Toldo, and Donald J. Gray, as research chemists or service managers.

This building program, it is said, reflects a continuing emphasis by the Michigan Chrome and Chemical Company upon improved research and development facilities.

CARPENTER ACQUIRES NORTHEASTERN STEEL

The Carpenter Steel Co., Reading, Pa., recently announced the official acquisition of the Northeastern Steel Corp., Bridgeport, Conn. The Northeastern concern becomes a wholly owned subsidiary of Carpenter Steel Company, and it will be known as Carpenter Steel of New England, Inc.

As soon as production facilities are ready, Carpenter of New England will start making electric furnace quality alloy and stainless steels at the local mill, which was rebuilt and modernized in 1955. The old open hearth furnaces will be dismantled to allow space for additional expansion. A special task force of production, management and technical personnel has been at work for several weeks to organize and prepare the mill for operation.

CHROME PLATING PROCESS FOR GAGES

The Lincoln Gage Company of St. Claire Shores, Michigan, has developed a chrome plating process called Lincaloy which is designed to assure long wear of gages and working parts. Lincaloy plating can be controlled in tenths and is applicable to thread plug and ring gages, as well as cylindrical or plain plug and ring gages. Gages are chromed under this process to size, and the close control of plating thickness is said to eliminate subsequent grinding making only a finish lap operation necessary.

Tolerances as close as 0.0001 inch are held without conforming anodes by controlling solution temperature, current density and plating time. Where tolerances must be held within millionths of an inch as in the case of special gages, a finish lapping operation is required. On parts within 0.0001 inch tolerance, this operation can be eliminated.

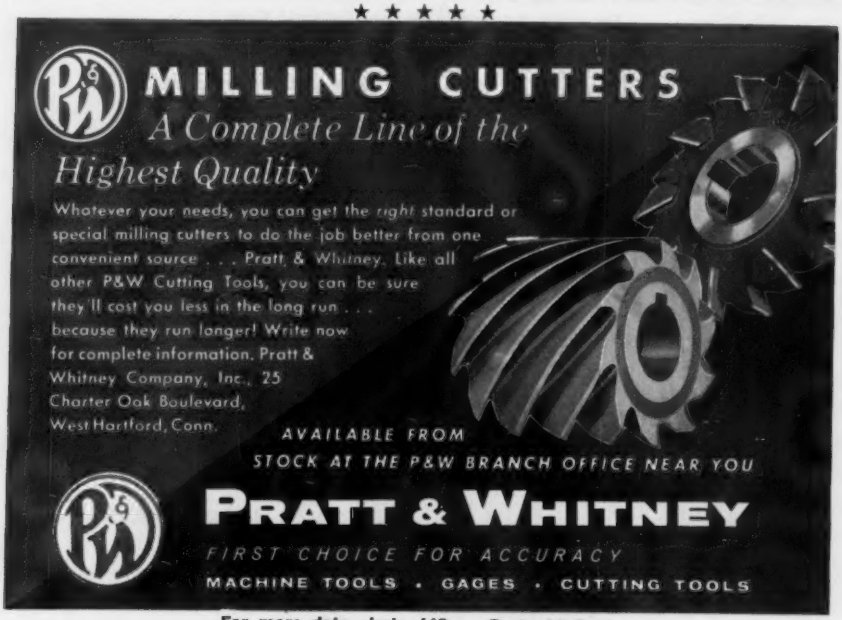
Besides the advantage of eliminating an operation or two, plating to size, it is claimed, produces a better surface and increased wear resistance because the density of the deposit is greater at the surface than it is at the base and, of course, it is the surface that is removed in grinding operations. In addition, grinding-wheel action tends to weaken the plate in thin deposits, so a better plate is obtained by eliminating this operation.

★ ★ ★

CARBORUNDUM COMPANY COMBINES DIVISIONS

The Carborundum Co., Niagara Falls, N. Y., has announced that its Stupakoff Division at Latrobe, Pa., Globar Division at Niagara Falls, N. Y., and Refractories Division at Perth

★ ★ ★ ★ ★


MILLING CUTTERS
A Complete Line of the Highest Quality
Whatever your needs, you can get the right standard or special milling cutters to do the job better from one convenient source . . . Pratt & Whitney. Like all other P&W Cutting Tools, you can be sure they'll cost you less in the long run . . . because they run longer! Write now for complete information. Pratt & Whitney Company, Inc., 25 Charter Oak Boulevard, West Hartford, Conn.
AVAILABLE FROM STOCK AT THE P&W BRANCH OFFICE NEAR YOU
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MACHINE TOOLS • GAGES • CUTTING TOOLS

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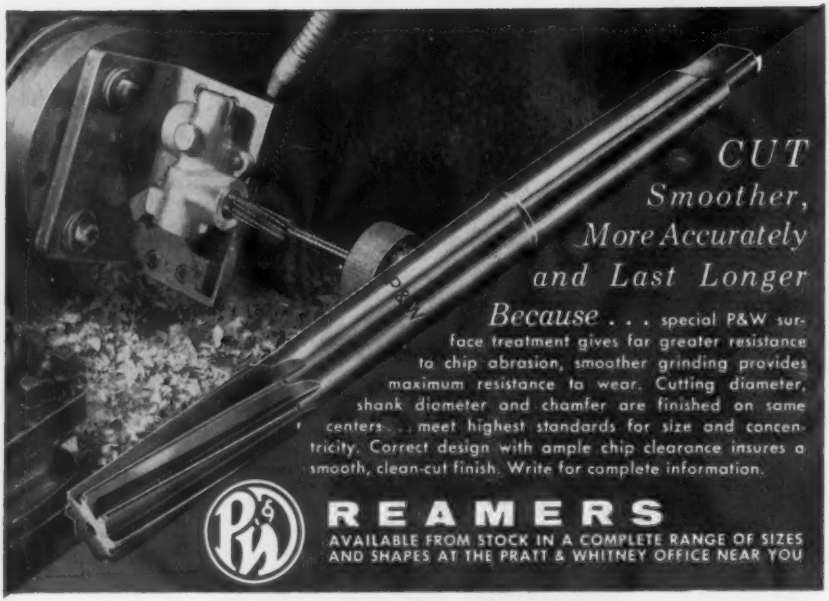
CUT
Smoother,
More Accurately
and Last Longer
Because . . . special P&W surface treatment gives far greater resistance to chip abrasion, smoother grinding provides maximum resistance to wear. Cutting diameter, shank diameter and chamfer are finished on same centers . . . meet highest standards for size and concentricity. Correct design with ample chip clearance insures a smooth, clean-cut finish. Write for complete information.
REAMERS
AVAILABLE FROM STOCK IN A COMPLETE RANGE OF SIZES AND SHAPES AT THE PRATT & WHITNEY OFFICE NEAR YOU

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★ ★ ★ ★ ★

news of the industry . . .

Amboy, N. J., will be integrated into one division, named the Refractories Division. All personnel, plants and activities, except the Stupalox sintered oxide cutting tool project formerly at the Stupakoff Division will be combined in the new division.

Boyd M. Johnson, vice president of the company, was named general manager of the new division. Robert A. Barr was appointed assistant general manager in charge of sales and A. L. Leo-Wolf was made assistant general manager in charge of operations. Johnson, Barr and Leo-Wolf were formerly general managers of the Refractories, Stupakoff and Globar Divisions respectively.

Other appointments include A. A. Turner, manager Refractories Sales; D. S. Bowman, manager Globar and electronic sales; H. M. Killmar, manager Perth Amboy plant; A. L. Donnenwirth, manager Falconer plant; J. W. Albright, manager Globar plant; R. C. Straka, manager Latrobe seals plant; R. Van Der Beck, manager Latrobe ceramic plant; E. H. Fritz, assistant to general manager of operations; C. P. Clapp, manager of manufacturing; J. M. Smith, manager marketing department; O. R. Stach, manager product engineering branch; E. F. Grimm, division controller accounting branch; and J. S. Catapano, manager personnel branch.

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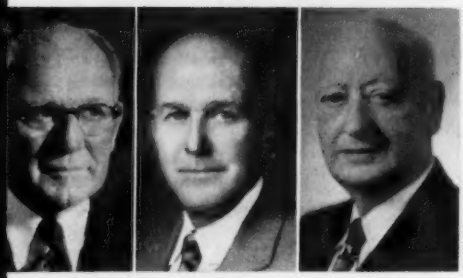
NATIONAL ACME MAKES CHANGE IN OFFICERS

The board of directors of The National Acme Co., Cleveland, Ohio, has



(Left) Frederic H. Chapin, (center) T. Laurence Strimple and Charlie W. Simpson

announced that Frederic H. Chapin, chairman of the board and president, has recently resigned his position as president after serving thirty-one years in that capacity. The board has elected T. Laurence Strimple, the secretary and general counsel, to fill that position. Mr. Chapin will continue to serve as the board chairman.

Charlie W. Simpson, vice president and director who has served the company for forty-eight years, has requested that he be relieved of active duties; however, Mr. Simpson will continue on a consulting basis after the end of the year. A successor has not been elected.

★ ★ ★

EX-CELL-O CORPORATION PURCHASES ROTO-MATION, INC.

Roto-Mation, Inc., 945 E. Sater St., Greenville, Ohio, a subsidiary of Pines Engineering Co., Inc., Aurora, Ill., and formerly known as Evergreen Industries, was recently purchased by Ex-Cell-O Corporation, Detroit, Michigan. The products which were formerly manufactured and sold by Roto-Mation, Inc., are still made in Greenville, Ohio, but are now known as Rotac (rotary, oscillating, torque actuator).

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Check Class 3 and 3A Threads

...DEPENDABLY, ECONOMICALLY

The P&W Tri-Roll Thread Comparator, using full-length rolls, provides a *complete functional check* . . . detects errors in lead, angle, pitch diameter and in deviation from true helical path ("drunken lead"). With interchangeable single-rib rolls, the same comparator provides a *critical check* of pitch diameter . . . duplicating, for the first time in a production gage, the highly precise 3-wire measurement method. Write for complete information. Pratt & Whitney Company, Incorporated, 25 Charter Oak Blvd., West Hartford, Conn.

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FIRST CHOICE FOR ACCURACY

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industry news in brief . . .

Don W. Branning appointed manager, **American Broach and Machine Division**, Ann Arbor, Michigan.

Chester S. Johns has joined the staff as sales manager and **Vernon H. Samson** as controller, **Buhr Machine Tool Company**, Ann Arbor, Michigan.

The Carpenter Steel Company, Reading, Pennsylvania, announces the opening of a new warehouse and office in Chicago. It will serve as midwestern headquarters for the main company and its Alloy Tube Division.

Joseph A. Boothroyd, Jr., has recently become associated with the George S. Maier Company, Ridley Park, Pennsylvania, as sales representative serving **Adamas Carbide Corporation**, Kenilworth, New Jersey, and **Size Control Company**, Chicago, Illinois.

Paul McGonigle, Richard R. Gould and **Jerry Weiss** have joined the district offices of **The Lincoln Electric Company**, Cleveland, Ohio—at Boston, Massachusetts, Pittsburgh, Pennsylvania and Detroit, Michigan respectively.

William A. Schrader promoted to Eastern Division manager, **Wales-Strippit Company**, Tonawanda, New York.

Maury Bureau appointed manager of newly opened sales office in Detroit, **Barry Controls, Inc.**, Watertown, Massachusetts.

Enlarge YOUR stockroom without moving walls

You can custom design storage facilities to suit your exact needs—with Equipto Steel Shelving Units. Eliminate "dead areas" and unnecessary bulk . . . enlarge your stocking area . . . accelerate stock handling.

Available in all sizes, either open or closed . . . dividers, panels, label holders, bin fronts, and drawer sections may be added or rearranged at any time. For further details on shelving and other Equipto products write for free 16 page booklet No. 256, "Short Cuts to Greater Profits."

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STEEL SHELVING . . . PARTS BINS . . . LOCKERS . . . DRAWER UNITS . . . CARTS . . . WORK BENCHES.

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Accurate Hole Transfer Made Easy With

NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 1/8" to 3/4" U.S.S. Inexpensive — Last for years.

Write for Circular

NIELSEN TOOL & DIE COMPANY
17360 Lahser Road, room 202
Detroit 19, Michigan

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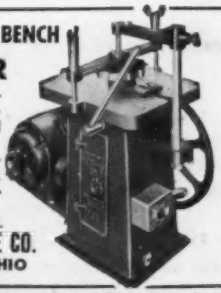
READING BENCH KEYSEATER

Portable — move directly to job; a time saver for both small and large shops.

3 1/4" stroke; adaptable for other work.

Low first cost — prompt delivery.

Good dealers wanted.



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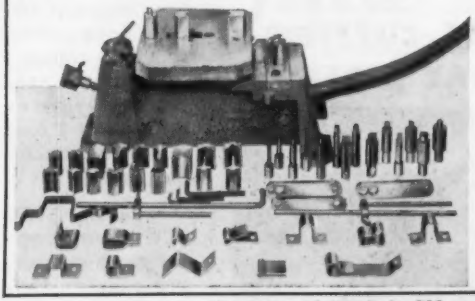

Multiform

BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, and Steel Rule Dies for Metal Blanking.

AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.
Dept. 6-M Kalamazoo, Mich.

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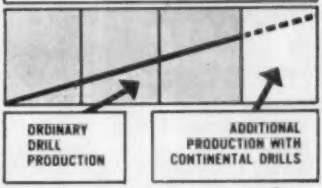
CONTINENTAL *Certified* **DRILLS**

STRONG

MORE HOLES PER DRILL

Today's drilling problems on both standard and new metals require twist drills with *something extra* built into them. That's why Continental drills are so acceptable to leading *cost conscious* production plants. Ask your industrial jobber

MAJOR PRODUCTION PLANTS PROVE CONTINENTAL DRILLS LAST LONGER!



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NEW YORK	LOS ANGELES	TACOMA, WASH.
50 Church Street	6551 Whittier Blvd.	2006 Center Street
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CONTINENTAL DRILL CORPORATION
555 W. Adams St., Chicago 6, Illinois

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industry news in brief . . .

Donald P. Lamb appointed supervisor of field sales and engineering, **Detroit Power Screwdriver Company,** Detroit, Michigan.

Wayne J. Neagles appointed general sales manager, **Turchan Follower Machine Company,** Dearborn, Mich.

The Greenfield Tap and Die Corporation, formerly at 15 Warren Street, has recently moved its office and warehouse to 32 Worth Street, New York, New York.

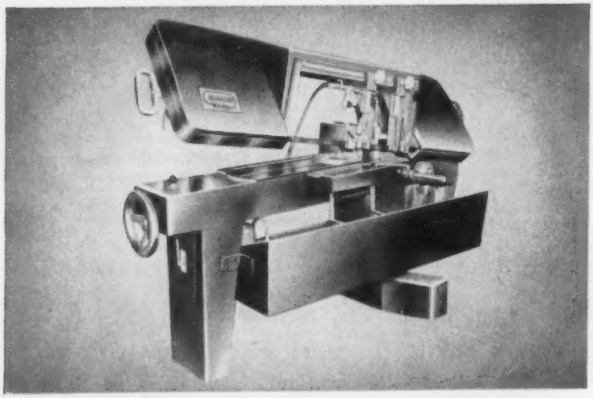
Tri-State Machinery Company, 535 McNeilly Road, Pittsburgh, Pennsylvania; **Gulf Coast Industrial Supply Company,** 2226 Fairfield Avenue, St. Petersburg, Florida; and **W. D. Allen Manufacturing Company,** 566 West Lake Street, Chicago, appointed representatives, **Greaves Machine Tool Company,** Cincinnati, Ohio.

Richard D. Madison appointed consulting engineer, **Buffalo Forge Company,** Buffalo, New York. **J. Barrie Graham** succeeds Mr. Madison as director of research.

John R. Keates appointed general manager, Machine Tool Division, **National Automatic Tool Company, Inc.,** Richmond, Ind.

Joseph Auslander and **Bruno Sonnenberg** announce the formation of their new company, **Index Industrial Corporation,** 150 Broadway, New York, New York.

FIRST 8-INCH METAL CUTTING SAW TO MEET TODAY'S NEEDS



KALAMAZOO

MODEL 8C

cuts 8" round, 16" flat, 8" pipe

Instant-acting vise holds work-piece. Four speeds for best cutting. Accuracy easily controlled—blade action in cut easy to see. Blades changed in seconds. Automatic shut-off. All parts readily accessible. Ask your Kalamazoo dealer to demonstrate Model 8C.

Kalamazoo Metal Cutting Band Saw Machines:

KALAMATIC BAR FEED for Kalamazoo.

MODEL 1220 cuts 12" round, 20" flat.

MODEL 610 cuts 6" round, 10" flat.

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO CO.

158 HARRISON ST. KALAMAZOO, MICH.

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a complete line

is the shortest distance to top production

The shorter the distance the less cost. Butterfield taps save time and cut your product costs — giving higher production and quality products with Butterfield tools.

There are Butterfield warehouses in Chicago, Cleveland, Detroit, Fort Worth, Los Angeles, New York, San Francisco. Butterfield Division, Union Twist Drill Company, Derby Line, Vermont.

BUTTERFIELD CUTTING TOOLS

...make the most of your product

SEE YOUR BUTTERFIELD DISTRIBUTOR FOR PRECISION-MADE
DRILLS • REAMERS • TAPS • DIES • CUTTERS • END MILLS • HOBS • CARBIDE TOOLS

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industry news in brief . . .

Elgin National Watch Company, Elgin, Illinois, announces the appointment of six new distributors: **N. T. Bushnell Company,** 285-295 State Street, New Haven, Connecticut; **Durant Tool Supply Company,** 15 Thurbers, Providence, Rhode Island; **Tools and Abrasives, Inc.,** 1510-1512 Oxford Street, Ft. Wayne, Indiana; **S.G.S. Tool Company,** 2060 South Arlington, Post Office Box 7063, Akron, Ohio; **Janco Industrial,** 117 South Wyman Street, Rockford, Illinois; and **B.S.A. Tools Limited,** 228 Norseman Street, Toronto, Ontario.

Hugh A. Allen appointed traffic manager. Mr. Allen succeeds **Frederick D. Wilson,** who retired recently after more than 46 years with **Norton Company,** Worcester Massachusetts. **Frederick A. Anderson** appointed traffic rate specialist. **William H. Silvester, Jr.,** appointed supervisor of traffic for Grinding Machine Division and **Frederick W. Lester** appointed supervisor of bill of lading section.

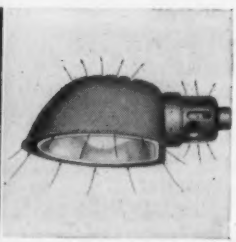
The Motch and Merryweather Machinery Company, 1250 East 222nd Street, Cleveland, Ohio, appointed exclusive representative, **Danly Machine Specialties, Inc.,** Chicago, Illinois.

Roy Hardy appointed Government Service representative, Automatic Controls Division, **Barber-Colman Company,** Rockford, Illinois.

DAZOR FLOATING LAMPS

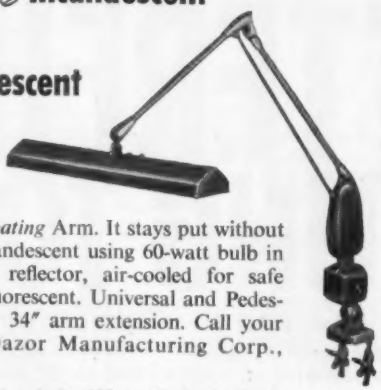
Fit the Lighting to Each User and Each Job

Top-Mounted Reflector



Side-Mounted

Air-Cooled **Incandescent or Fluorescent**



People . . . jobs . . . lighting needs differ. Let each employee control light location with the Dazor *Floating* Arm. It stays put without locking. Choice of Incandescent using 60-watt bulb in top- or side-mounted reflector, air-cooled for safe handling; or 2-tube Fluorescent. Universal and Pedestal models with 24″ or 34″ arm extension. Call your Dazor distributor. Dazor Manufacturing Corp., St. Louis 10, Mo.

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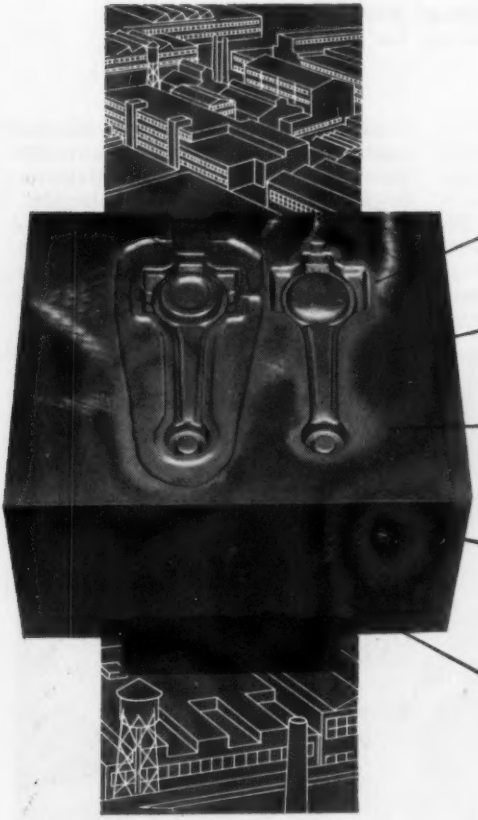
...somewhere this forging die is making history!



Both halves of the die were Eloxed in only 50 hours.

Elox equipment used to create the impression costs less than half of conventional tooling equipment.

After washout, Elox equipment will have it back in service in seven hours.

In our Pre-purchase Evaluation division we will demonstrate how Elox can machine the cavities in your closed impression dies at 75% of your present cost. Write or phone today.

10" Connecting Rod Forging
Max. depth impression: 5/8"
Min. depth impression: 1/16"
Tolerances: + or − .003"

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ELOX keeps you ahead of competition • All forms of Die Making • Form Grinding and Tool Sharpening

For details on how EDM machining of cavity type dies can prove profitable for you, write for Bulletin P7-1257

For more data circle 450 on Postpaid Card

Descriptions of new machines, tools and materials for metalworking.

FOUR SPINDLE BORING MACHINE FEATURES NUMERICAL CONTROL

Barnes Drill Co., 860 Chestnut St., Rockford, Ill., recently introduced its BarnesdriL Horizontal Boring Programming Machine, which utilizes four spindles selected for four operations by punched tape. The operator locates the part in the fixture, by means of an alignment telescope focused on the dividing line of the part, and starts the cycle. Upon the completion of 248 operations of finish bore, generating front face and back counterbore, the operator removes the completed part. At no time during the

Barnesdril Four Spindle Numerically Controlled Boring Machine performs 248 operations

Edited by L. L. BALDHOFF

operation of the machine is the operator required to change tools or to make adjustments.

This machine has been specifically designed to work on the periphery of cylindrically shaped parts with minimum diameters of 50 inches and maximum heights of 40 inches.

Through tape control, as many as four operations can be performed on one specific hole. The speeds are automatically changed by tape in any combination of four and the feeds and lengths are controlled by information punched in the tape.

This particular machine is set up to put 248 holes into a compressor casing. The holes are of three different sizes and, therefore, require three different operations.

The operations required for machining the compressor casing are finish boring, generating front face and back counterbore. The tolerance of the wall thickness between the front face and the back counterbore has to be held. This operation requires a generating spindle and form tool.

All positioning of machine motions, as well as operator and machine instructions, is done simultaneously and from information punched in the tape. This will lend complete flexibility to the control in the event that it is used in the manufacture of different parts.

The machine is equipped with a four spindle heavy duty boring head, mounted to a compound slide. The boring head consists of one precision boring spindle and three hydraulically actuated precision feed out quill and spindle assemblies. These are individually controlled for three different feed out ratios. Driven by a 1 h.p. motor, the vertical motion of the spin-

Close-up view of the work being machined

dle is 60 inches per minute. The spindle will locate vertically over a maximum range of 40 inches.

The 55 inch rotary table is powered by a 1½ h.p. gear motor and will index through 360 degrees from a given reference point at a speed of approximately 5/6 r.p.m. The table is equipped with a lifting mechanism for rotation and a clamping arrangement for locking the table in position when the correct position is reached.

The machine will maintain an accuracy of 0.005 inch true position and repeatability of plus or minus 0.001 inch. The alignment of the machine in all planes is less than 0.001 inch. All feed screws on the machine, including the spindle feed out screws, are precision engineered Ball screws.

Lubrication to all points of the machine is done automatically with necessary warning signals in the event of low oil level or broken lubricating lines. Spindles are lubricated by an oil mist and the ways are lubricated through a multi-valving system.

The positioning of the machine is done through numerical positioning information punched in standard eight channel tape. Information for vertical positioning is punched in the tape in increments of 0.001 inch, which is the smallest bit of information to be recorded for vertical movement. Information for rotary indexing is punched in the tape in terms of degrees and decimal parts of a degree. The smallest increment being 0.002 degree — converted into linear dimensions on a 27½ inch radius is 0.001 inch.

All rotary positioning is in relation to a common reference point (zero position of the table), which is said to eliminate the possibility of accumulative error and assure accurate relative positioning throughout the entire range of 360 degrees. The necessary information is taken directly from the engineering drawing in coded decimal form. The tape can be punched on any standard commercial controls typewriter, as used for business machine equipment. The machine is complete with a tape reader. The tape reader in the machine is a standard commercial type for eight channel tape and is equipped with a magazine that stores a maximum of 100 feet of endless tape.

The control equipment on this machine was furnished in its entirety by General Electric's Specialty Control Department, Waynesboro, Virginia.

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★ modern machine shop ★

LIVE CENTER EMPLOYS BALL AND ROLLER BEARINGS

The George Scherr Co., Inc., 200-MM Lafayette St., New York 12, N. Y., recently announced that its G. S. Live Centers have been designed to have a life expectancy of approximately 10,000 working hours. By employing ball and roller bearings, G. S. Live Centers guarantee that radial and lateral thrust are sustained, avoiding wear and possible damage.

These super accurate live centers are claimed to hold runout to within 0.0001 inch total indicator reading. The manufacturer claims that one of the outstanding features is that G. S. Live Centers have to be oiled only once a year.

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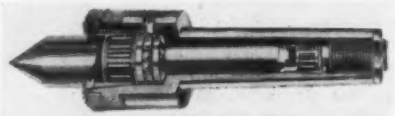


G. S. Live Center has a life expectancy of approximately 10,000 working hours

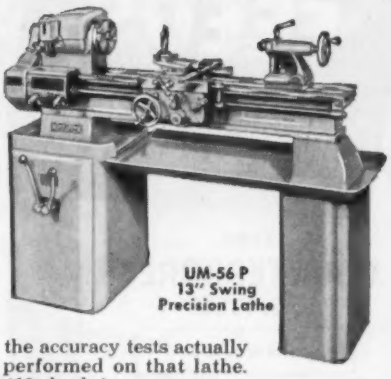
SHELDON Precision LATHES

for the size Lathes You Need Most

Sheldon lathes are built in the sizes you need most, for toolroom and production jobs. They are available with swings of 10", 11" and 13"... in varying bed lengths with 18" to 48" center distances . . . and . . . in your choice of pedestal, cabinet or bench mountings.

Powerful, all-V-belt, drive units—either the standard 8-speed (or 16-speed) E-drive; or the production favorite, a rapid, lever-shift U-drive. Where higher spindle speeds are desired, the standard E-drive can be built to provide speeds up to 2,000 r.p.m.

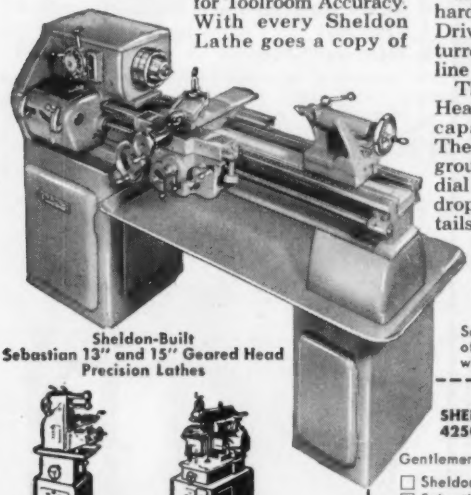
All Sheldon Lathes have handscraped, built-in precision. Each lathe is guaranteed to meet or surpass the American Standards for Toolroom Accuracy. With every Sheldon Lathe goes a copy of the accuracy tests actually performed on that lathe. (19 checks).



UM-56 P
13" Swing
Precision Lathe

Important optional features include: hardened bed ways, L00 Long Taper Key Drive spindles, 4" D1 Camlock spindles, bed turrets, taper attachments and a complete line of toolroom and production accessories.

The new Sheldon-built Sebastian Geared Head Lathes have greatly increased work capacity and many advanced features. These include a wide, heavy, hardened and ground bed . . . easy shifting spindle speed dial . . . 60-pitch gear box . . . independent drop lever apron clutches . . . cam-action tailstock clamp . . . and, automatic lubrication in the headstock and apron with "1-shot" lubrication of carriage.



Sheldon-Built
Sebastian 13" and 15" Geared Head
Precision Lathes

SHELDON
Horizontal Milling Machine

SHELDON
12" Shaper

SHELDON MACHINE CO., Inc.

Builders of Sheldon Lathes, Milling Machines, Shapers and Sebastian Lathes.

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Send in coupon or write for catalogs and names of nearest Sheldon and Sebastian Distributors where you can see these new lathes in operation.

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☐ Sheldon ☐ 10", ☐ 11' ☐ 13" Lathes
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Street Address ..... ☐ Company ☐ Home

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AVAILABLE FROM STOCK FOR EACH SCREW SIZE

30° Right Hand Spiral, 4 Flute

Now you can speed up production 100% with our *New* 30° fast right hand spiral, four-flute counterbores.

You will find that faster feeds are possible with this freer-cutting tool.

Hardened counterbore blanks in stock can be ground to any special pilot and flute diameters in one week.

Free Complete Reamer catalogue with world's Greatest Reamer selection by the Thousands' and thousandths.

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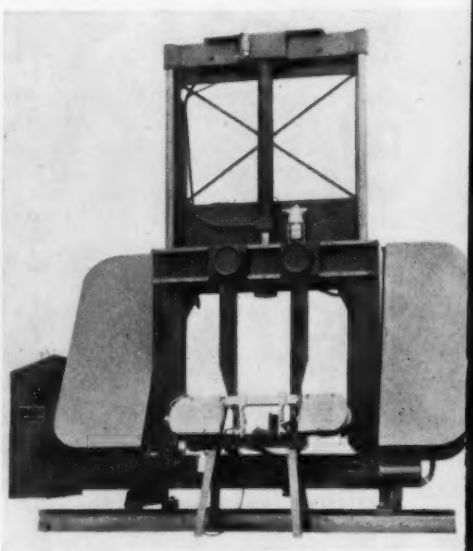
new shop equipment . . .

GIANT HORIZONTAL BAND SAW

W. F. Wells and Sons, Dept. M, Three Rivers, Mich., announced a giant horizontal band saw, weighing 5,690 pounds which is said to cut a 24 inch round carbon log in less than one minute. Designated as the Special Model J-38, it will cut up to 40 inch rounds. The 1¼ inch blade is driven on four wheels at variable speeds from 300 to 2,300 feet per minute.

The cutting head is raised hydraulically on rollers to minimize friction and give a steady feed. It can be built to meet individual specifications and with other speeds. One of the firm's standard metal cutting band saws is shown in the accompanying illustration along with the Special Model J-38 to show its huge size—122 inches wide and 122 inches high.

For more data circle 73 on Postpaid Card



W. F. Wells Horizontal Band Sawing Machine

Spartan Announces

NEW High Speed SAF-T-HAND HACK SAWS

Shatterproof - Flexible - Fast Cutting - Wear Resistant
it's *an amazing new blade* by **SPARTAN.**

Sparty says:

It gives extra cutting value, withstands twists and kinks without effecting saw life.

See Your Spartan Distributor

SPARTAN SAW WORKS, SPRINGFIELD, MASS.

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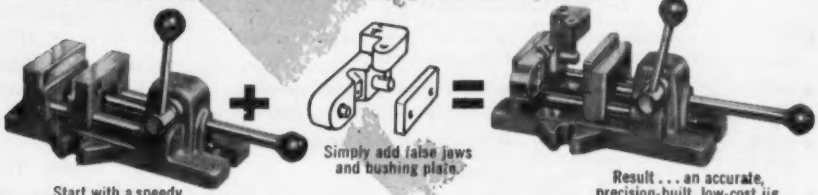
HERE IS JUST ONE OF THOUSANDS OF APPLICATIONS

heinrich Grip-Master

HOLDING DEVICES

speed production and cut tooling costs up to 75% and occasionally more. One glance at the example below will tell you why more and more cost conscious tool designers, nation-wide, start jigs and fixtures with a Heinrich Grip-Master. It's the easy way to solve your jig and fixture problems.



Start with a speedy Grip-Master vise and fixture base.

Simply add false jaws and bushing plate.

Result . . . an accurate, precision-built, low-cost jig.

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HEINRICH TOOLS, Inc., Dept. 118-A, Racine, Wis.

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new shop equipment . . .

PORTABLE ARC WELDER

The Lincoln Electric Co., Dept. 3516, Cleveland 17, Ohio, has announced a new model of its 6090, 200 ampere, gasoline engine-driven portable arc welder. The welder, called the K-6090, is NEMA rated 200 amperes at 40 volts and 60 percent duty cycle, has dual controls for the generator output, an electrical outlet providing 1 kw. of auxiliary d.c. power, an idling device and is powered by a 36 horsepower water-cooled engine.

Controls on the Model K-6090 include a five step selective current control and a continuous voltage control, which also provides fine adjustments in the current. The ranges of the steps on the selective current control overlap, so that it is possible to obtain either a high or a low open circuit voltage for any current, thereby selecting the type of arc most appropriate for the work. The auxiliary power is 115 volt, d.c., which may be used for power tools or lighting. Welding controls, auxiliary power outlet and wing-nut output terminals for the welding cable are all externally mounted and readily accessible.

A high compression head Continental F-162 gasoline engine, that drives the welder, develops 36 horsepower at the 1,450 r.p.m. operational speed of the welder. Its output is said to exceed the normal demands of the generator and

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- Spindle speeds up to 26,000 rpm to engrave or for machining modern materials
- Fastest possible copy set-up
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- Cutter grinders, rotary tables, master letters, compound slides, name plate blanks and all required accessories

MODEL D2 HEAVY-DUTY 2-DIMENSIONAL

- 575 pounds-rigid, sturdy, precise
- Vertical adjustment of copy table automatic with Pantograph
- Unobstructed on three sides to take large work
- Vertical range over 10 inches
- Micrometer adjustment for depth of cut
- Ball bearing construction throughout — super precision ball bearings in spindle
- Ratios 2 to 1 to infinity — master copy area 26" x 10"

MODEL 106 PORTABLE BENCH MODEL- 2- OR 3-DIMENSIONAL

- 40 pounds of unbeatable speed and accuracy at a reasonable price
- Perfect for all machining applications within its range
- Ball bearing spindle has three speeds up to 14,000 rpm
- 5 positive, accurate pantograph ratios
- One copy carrier (supplied) accepts all master sizes
- Height of pantograph and position of cutter are continuously adjustable
- Work up to 10" by any width
- Taper shank cutters

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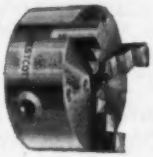
TOP QUALITY CHUCKS

SINCE 1872



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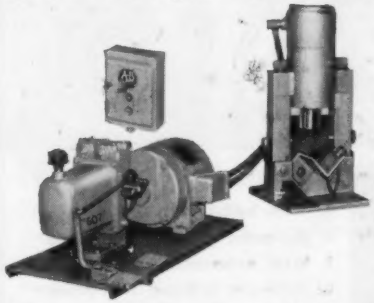

Capacity . . . 18 ton. Stroke 1¾", cycle time 6 seconds. Shears angle iron 4" x 4" x ¼", flats ⅜" x 3½", squares ½" rounds ⅝". Hydraulic, operated by foot treadle. Tool is simple, powerful, compact.

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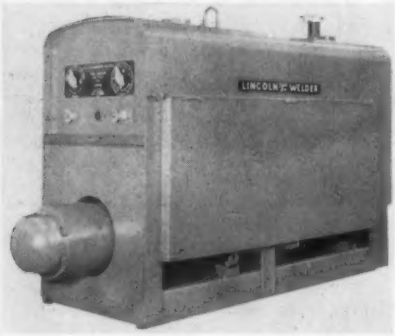

Lincoln Gasoline Engine-Driven Welder

provide reserve power for smoother and more responsive operation and extend the life of the welder. A tamper proof idling device reduces engine speed to 1,000 r.p.m. when the welder is not in use. When the arc is struck, it immediately accelerates the engine to its normal 1,450 r.p.m. operational speed.

A large, 16 gallon gasoline tank will operate the unit for 14 hours, at a 60 percent duty cycle, without refilling. Included on the welder as standard equipment are an oil bath air filter, a complete housing including side doors and a cold weather carburetor deicer. A battery-magneto starter is available as optional equipment.

For more data circle 74 on Postpaid Card

★ modern machine shop ★

HAND SCREW MACHINE FOR SHORT RUN WORK

A versatile hand screw machine has been introduced by Rockwell Manufacturing Co., Delta Power Tool Division, 475 North Lexington Ave., Pitts-

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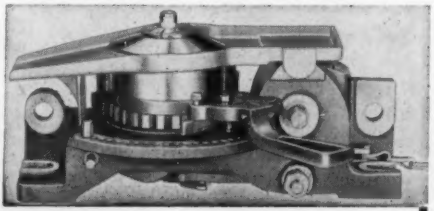
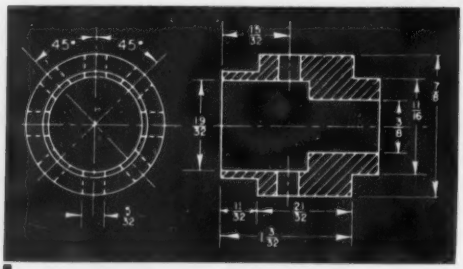
CUT COSTS
ON SECONDARY OPERATIONS WITH THE
DEARBORN
AUTOMATIC CHUCKING AND INDEXING FIXTURE





This piece was made from Brass. It was necessary to drill all holes from the outside to minimize the burring time. Production was about 100 pieces per hour or 800 holes per hour.

Features:

1. Work held by collets
2. Automatic opening and closing
3. Work automatically ejected
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5. Three models with capacities from 1/32" to 2"

Write for illustrated data. Send blueprints or specifications of work.

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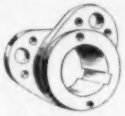

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CAMS like these . . . and many others . . . are produced by ROWBOTTOM

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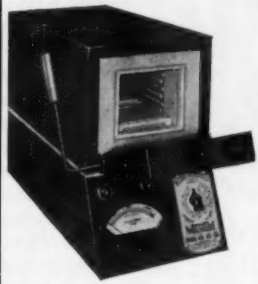

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***DeLuxe* ELECTRIC FURNACES**

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Model No.	Inside Dimensions Wide	High	Deep	Temp. Range	Watts 110 Volts AC	Price
434DL	4¼"	3⅝"	4¾"	300°-1600° F.	920	$ 90.00
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5DL	4⅝"	3¾"	9"	300°-1900° F.	1750	176.00
9DL	6"	6"	6"	300°-1900° F.	2200	200.00
669DL	6"	6"	9"	300°-1900° F.	3000	248.00
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• Available for 220 Volt AC at small additional cost. Stainless steel housing slightly higher.

• Write today for literature on complete line of Huppert furnaces and ovens in floor and bench models.

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burgh 8, Pa. Designed primarily to cut costs of manufacturers frequently faced with short production runs—50, 500 or 1,000 pieces, for example—the machine combines the time and cost saving features of rapid chucking and multiple tooling with the advantages of low initial investment, low maintenance costs and power consumption, minimum setup and changeover time and small space requirements.

It is described as ideal for repetitive manufacturing of a wide variety of parts ranging from simple pieces, such as washers and shafts, to the most intricate parts, such as those used in the electronics and aircraft industries, or any operation involving production of a limited number of precision parts. The machine features a bed turret with six stations for up to six operations. The turret is moved quickly from one operation to the next with a simple turn of the pilot wheel — and the workpiece is chucked in a fraction of a second by a touch on a conveniently located lever.

An important advantage also claimed for the machine is a unique pilot wheel feed, which is the outstanding feature of a completely new double tool post cross slide. This feature combines rapid slide movement with a full 8 inch travel which increases the size range of jobs that this machine can perform.

Universal tool positioning is made possible by a new feature. Tee slots in the

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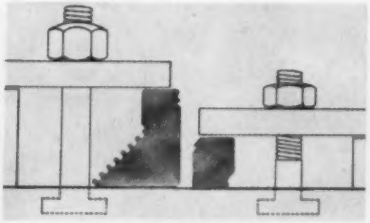

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Made in Three Sizes to Fit Your Requirements:

Model A...1" (max. capacity 1-1/16")
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Model C...3" (max. capacity 3¼")

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"TRU-LOC" Adjustable Adapter Sleeves & Nuts

A. G. D. Plug & Ring Gages

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Descriptive Bulletins, Prices, and Dimensional Data Sheet No. 7-A upon request. Ask for prices on salvaging worn-out plug and ring gages.

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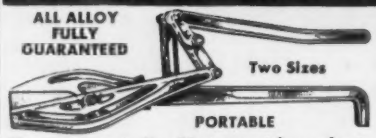
tool post pad and slide make possible transverse and longitudinal adjustment without disturbing the saddle on the bed. The hardened steel tool posts have left and right tool positions, sliding wedge height adjustment that eliminates the need for shimming,

BREMIL
The IMPROVED Compound Lever Shears



No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to ¼" steel plate.
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1020 Holland St., Erie, Pa.

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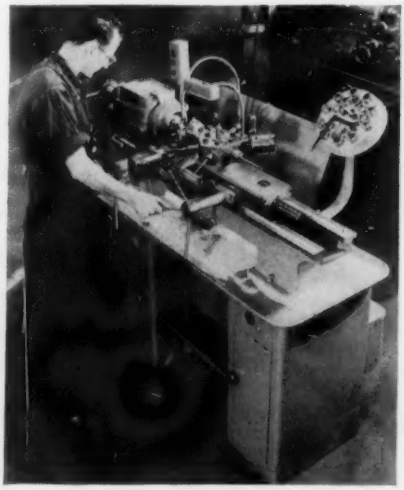

Delta Hand Screw Machine for short run work

and adjustable tool bit stops which have been designed so that either angular or straight tool settings can be maintained perfectly when a tool bit is either sharpened or replaced.

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with Air-O-Check, the Leak-Proof Air Gun. Hundreds of thousands in use in factories, machine shops and foundries . . . wherever air is blown.

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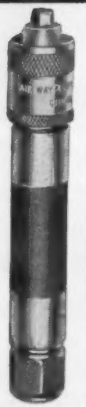

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. . . *just connect to gas supply!*

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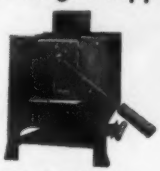
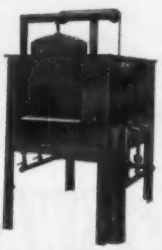


High Speed Full Muffle Furnaces



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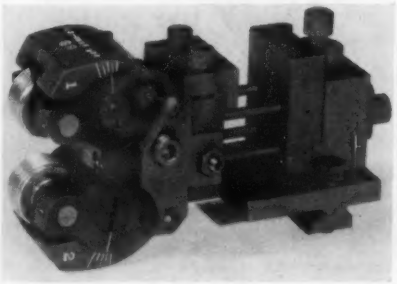
new shop equipment . . .

matic screw machines has been announced by Reed Rolled Thread Die Co., Worcester 1, Massachusetts.

This Reed Model B 8 Thread Rolling Attachment was developed with the cooperation of automatic screw machine manufacturers for use on the 7/16 inch Model RA-6 Acme-Gridley, the 9/16 inch Model TK Cone and similar size automatics, where the larger size Reed Series B Attachments are not applicable.

The B 8 Model provides diameter capacities from 0 to ½ inch and incorporates the same design features as all other Reed Series B Thread Rolling Attachments. There are now five standard stock sizes for use on more than 100 different single and multiple screw machines. Adapters are available for more than 300 cross slide applications. According to the manufacturer, complete diameter capacities range from 0 to 2¼ inches. Approximately 185 common screw threads may be rolled.



Reed Model B 8 Thread Rolling Attachment

Straight and taper pipe threads that may be rolled total eighteen, including Dryseal (NPTF).

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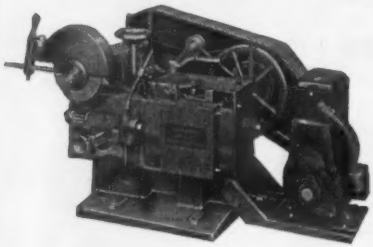
This Investment PAYS OFF

Automatic Metal Saw Grinder Cuts Costs

. . . Makes Money For You!



Wardwell's "35-T" will sharpen up to 115 saws .015 thick at one time. This includes slitting and screw slotting saws and milling cutters. Takes saws from 2" to 5½" diameter. Completely automatic. No attention is required after machine is started. These ingenious, compact and sturdy grinders are saving and making money for their owners all over the world.

Write for Bulletin 35T

WARDWELL

3803 Ridge Road
Cleveland 9, Ohio

Maker of Largest Line of Saw and Tool Sharpening Machines

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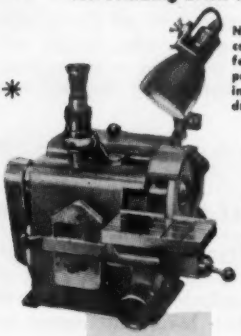
New GRINDING MACHINE
for Grinding Drills (0.012" to 0.120")



NOW, even the unskilled can sharpen drills perfectly every time. Compact. Furnished complete including Diamond Wheel dressing attachment.

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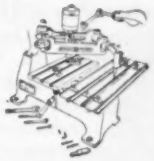
- Preparing hardened steel or glass for acid etching ask for Preis-Ponto Model UA-M.

Preis is the "one source" solution for your engraving problems. Complete line of accessories and attachments are available for all makes and models.



There's a Model available to solve all your particular problems economically.

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Write for complete details and prices. For immediate attention write directly to manufacturer below. Ask for nearest representative.

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MODEL NO.	FIRING CHAMBER (H.W.D.)	PRICE (300° to 2000°)	PRICE (400° to 2300°)
P46	4½"x4½"x6"	$90.00	$110.00
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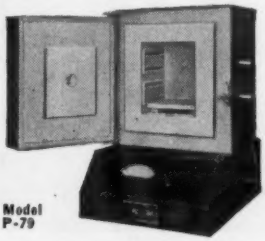
P124	12"x12"x24"	$715.00	$822.25
P818	18"x18"x18"	$775.00	$887.50
P136	18"x18"x36"	$1125.00	$1312.50

Automatic Controls Available on all Models

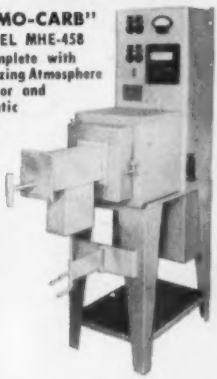


Model P-79

- Infinite zone temperature control
- Zone temperature indication by Pyrometer Selector Switch
- Automatic hold and cut-off instrument available
- Patented element holders
- Infinite variety of time-temperature curves obtainable
- Rugged construction

"ATMO-CARB"
MODEL MHE-458

Complete with Carburizing Atmosphere Generator and Automatic Control



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Other Sizes and Arrangements Available

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Chester 71, Pa.

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new shop equipment . . .

HYDRAULIC SLOTTER OFFERS BOTH TRACING AND SLOTTING

A 20 inch hydraulic slotter, manufactured by Rockford Machine Tool Co., Dept. 210, 2500 Kishwaukee St., Rockford, Ill., is capable of both conventional slotting and complicated tracing work, featuring quick change from standard work to tracer work and vice versa. A transverse movement of the slotter table makes rotary or straight work possible. Equipped with the highly sensitive Kopy-Kat Duplicator, this slotter will produce its own working templates from a toolroom master or from a finished workpiece.

In addition to the powerful hydraulic fulcrum drive to the ram, this machine has pendant controlled cutting speed changes; hydraulic feeds and power rapid traverse in all directions; dividing head; and stroke length adjustment while the ram is in motion.

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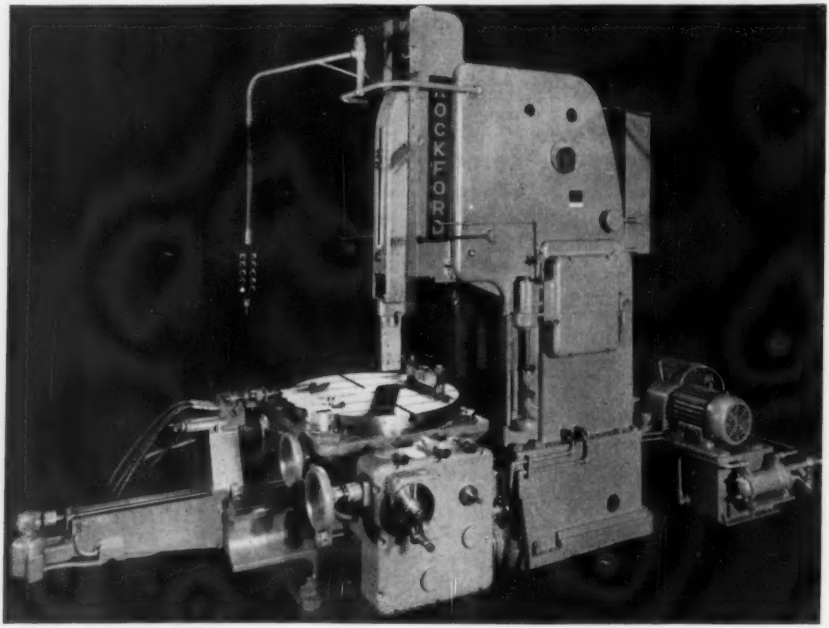
★ modern machine shop ★

DUAL-SPINDLE SURFACE GRINDER

A Giant Plano Surface Grinder, with two work spindles and capable of handling and grinding work up to 80 inches wide, has been announced by Mattison Machine Works, Rockford, Ill. Providing two powerful spindle motors enables a variety of surfaces on extremely large work to be handled in a single setup, thereby maintaining exceptional accuracy and precise rela-



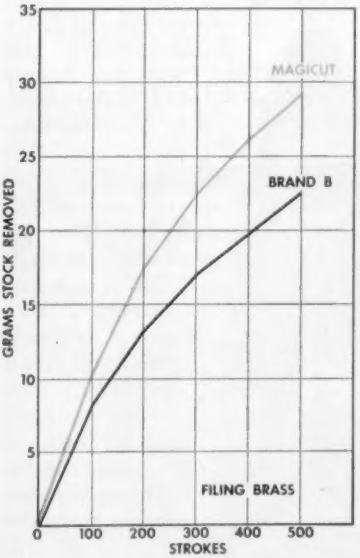
Rockford 20 Inch Hydraulic Slotter is capable of both slotting and tracing

Laboratory report:

New "Magicut" file outperforms other types by wide margins on varied industrial metals

Only way to prove what the new Nicholson or Black Diamond "Magicut" All-purpose Machinist's file will do for you is to try it in your plant.

But we've conducted some laboratory tests. Results of these will give you an idea of the savings you can expect with this unique new file. We compared "Magicut" with all kinds of Machinist's files—old and new, ours and others. (Of course these were *hand* tests.)



In just one part of these trials—comparing our new file with another described as being similar in purpose—we found these percentage superiorities for "Magicut": 28.8% over Brand "B" on brass (shown in chart) . . . 24.7% on aluminum . . . 16.2% on magnesium . . . 15.4% on .70 carbon steel . . . and 11.4% on copper. *And these have been proved in the field.*

There's not another file that can cut your metal filing costs like the Nicholson or Black Diamond "Magicut" can. Because not another file has the "Magicut's" Penetrating Planer-type Teeth. These rough and smooth industrial metals in a single stroke. You need fewer files—fewer strokes per job.

"Magicut" is the cost-cuttingest file you can use. Available right now in Flat, Half Round and Square shapes . . . 8", 10", 12" and 14" lengths. See and try "Magicut" soon.

FREE: Complete reports of "Magicut" laboratory findings. Send for this authoritative guide to lower filing costs.

Industrial Distributors provide the finest goods and services in the least possible time. Our files are sold exclusively through them.

"Magicut's" perfectly formed gullets eliminate "pinning" and consequent scratching. Note steep-angled serrations which produce maximum cutting surfaces.

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NICHOLSON FILE COMPANY, PROVIDENCE 1, R. I.

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

BLACK DIAMOND U.S.A.

NICHOLSON and BLACK DIAMOND FILES

A FILE FOR EVERY PURPOSE

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tive alignment of all work surfaces. Further indication of the size of work that can be handled on the giant Plano is provided by the 60 inch clearance under the grinding wheels to the table top.

Both heads are controlled by the operator from the single pendant. An interlock system provides maximum safety in preventing machine and work damage by accidental depressing of a wrong control button. The table always starts in a forward direction so that the operator always knows the direction of movement in advance.

Among the machine controls provided at the pendant are cross travel of both spindle heads (including reversal points), table speed, feed rate, raising and lowering of rail, inching table forward or verse, plus stop and start of table reciprocation. To move the table to the "out" position for loading, the operator merely depresses a "reverse out" button that automatically moves the table to the end of its travel and stops the machine. To simplify the operator's job, pilot lights on the pendant illuminate to indicate which controls are operative.

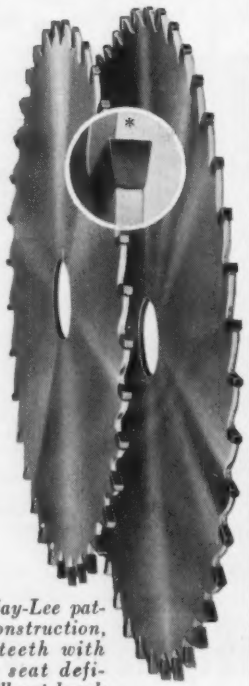
Both hydraulic and mechanical cross feed are provided. Hydraulic power provides traversing and jump feed in increments from ½ inch to 4 inches. Table feed rate ranges from 5 to 100 feet per minute and cross slide

GAY-LEE CARBIDE "THINSAWS"

FOR SAWING, SLOTTING, SLITTING

For fast, precision sawing, slotting or slitting, use a Gay-Lee "Thinsaw." Even when wafer-thin for delicate work, these saws maintain positive alignment and rigidity for full-depth cutting without run-out. Carbide tips for speed and long life, brazed into a special, patented seat that holds them firmly. Thickness as low as .030", thickness tolerance held to .0001", O.D. 1¼" to 10". For ferrous, non-ferrous, plastics, etc. Any tooth form available. Send details of your problem for recommendation and quotation.

Patented—Manufactured under license.



**With Gay-Lee patented construction, brazed teeth with circular seat definitely will not break loose from saw body.*

GAY-LEE COMPANY

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Boring Tools
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for Holes from 1/16" Upward

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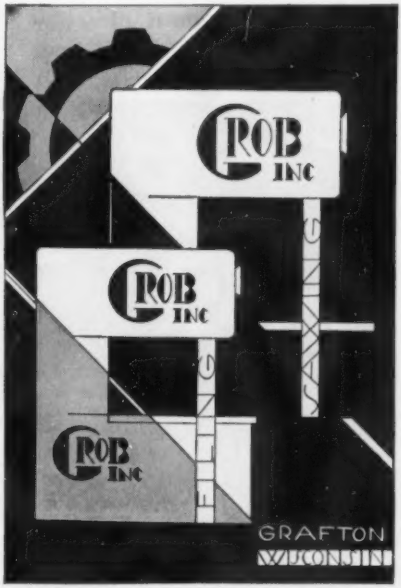

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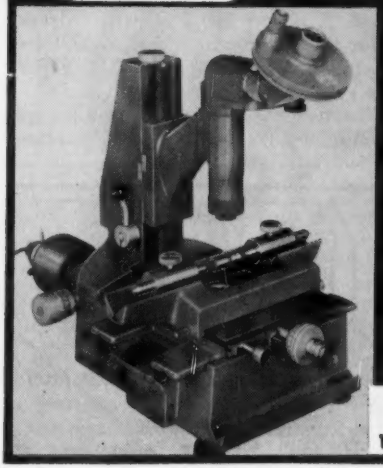

- Permits measurements in 2 dimensions plus checking of Radii, Concentric Circles, threads and angles.
- Has exclusive intermediate image system which combines coordinate measuring microscope and optical comparator in one instrument.
- Built-in charts permit use in three magnifications.
- Reads to .0001" or to .00005" from Master glass scales in larger models.
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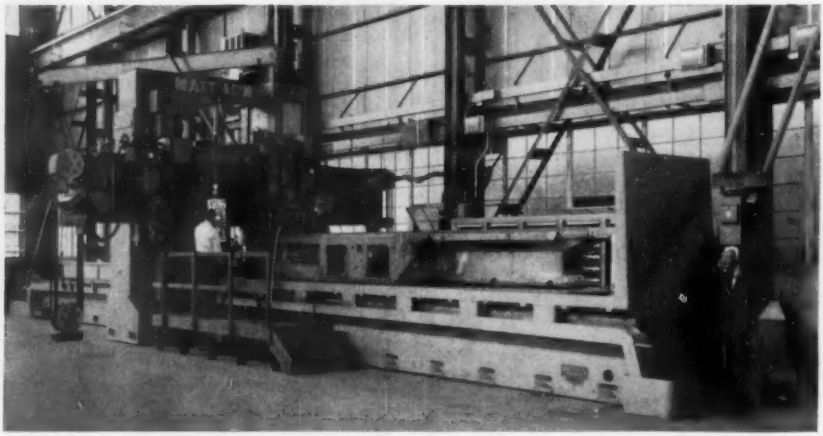


Mattison Giant Plano Surface Grinder handles work up to 80 inches in width

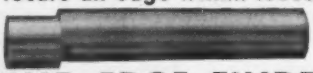
from 5 to 30 feet per minute. Use of a built in, direct drive motor on the vertical spindle permits unusually fine finishes to be obtained. In addition, the vertical head swivels up to 50 degrees each way, permitting the machine to grind vee and flat ways, dovetails, shoulders, edges, radii and contours all in a single setup.

Both spindles are provided with 30 h.p. motors and a 40 h.p. motor is provided for the table drive. A total of 20 motors is used on the machine to enable the operator to control all movements from a single station with an exceptional degree of precision.

The horizontal spindle takes up to a 22 inch diameter by 6 inch face wheel and the vertical spindle takes up to a 20 inch diameter segmental wheel. A power operated wheel dresser for the horizontal wheel is included as standard equipment with the surface grinding machine.

The weight of this machine is approximately 250,000 pounds. The base

1 Minute
to locate an edge within .0005"!



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BY A QUICK, EASY, INEXPENSIVE METHOD
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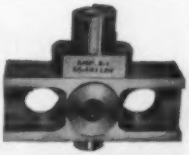

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MODEL 580
Self - centering Geared Scroll UNIVERSAL • Three Jaws

Includes 1 set External Jaws, 1 Key, 1 set Internal Jaws, 3 Pinions, 3 Bolts.

IMMEDIATE DELIVERY

SIZE	WEIGHT (lbs.)	CHUCK BORE	PRICE
3″	3½	⅝″	$ 35.75
4″	8	1″	35.75
5″	12	1¼″	41.50
6″	17½	1 1/16″	48.00
7½″	29	2″	56.50
9″	42	2½″	71.50
10½″	62	3″	88.50
12″	88	3″	120.00
15″	143	3¼″	180.00
18″	200	4″	261.00
21″	262	4½″	320.00
24″	324	4½″	390.00

MODEL 550
4-JAW INDEPENDENT CHUCK

Includes 4 operating screws, 4 Reversible Jaws, 4 Bolts, 1 Key.

Order Today

SIZE	WEIGHT (lbs.)	CHUCK BORE	PRICE
4½″	8	1″	$ 30.50
6″	16	1 1/16″	35.00
8″	34	1¾″	51.00
10″	60	2″	62.50
12″	80	2¾″	74.50
14″	98	3″	84.00
16″	126	3″	105.00
18″	166	4″	140.00
20″	204	4″	165.00
22″	246	5″	205.00
24″	322	5″	220.00
30″	490	5½″	340.00

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Dealers in Tool Room Equipment

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For This Production Boosting

"TRICO-MIST" COOLANT SYSTEM

With Flexible Armored Coolant Lines And Kwik-Change Nozzle

For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers—single or multiple outlets—single or dual valve control.

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TRICO FUSE MFG. CO.
MILWAUKEE WIS. U.S.A.

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is 57 feet 8 inches long, and the table top is 60 inches wide by 24 feet long. Work up to 80 inches in width can be accommodated on the table of this surface grinder.

For more data circle 78 on Postpaid Card

★ modern machine shop ★

MACHINE TOOL CLAMP ASSEMBLY

Complete manufacturing and sales operations of a self-contained, rapid adjustable Hi-Lo Machine Tool Clamp Assembly are under way by Hi-Lo Products Co., a division of Steel City Testing Machines, Inc., 8817 Lyndon Ave., Detroit 38, Michigan.

The company is concentrating full production on the Hi-Lo Strap Clamp Assemblies with clamping ranges of $\frac{7}{8}$ inch to $2\frac{1}{4}$ inches and $2\frac{3}{8}$ to $4\frac{7}{8}$ inches. Models are available with tee or stud bolt subassemblies which are interchangeable, have the $\frac{1}{4}$ turn serration lock feature that provides quick, safe and accurate adjustments. Other features are: no loose pieces, and ease of setup with minimum time-out.

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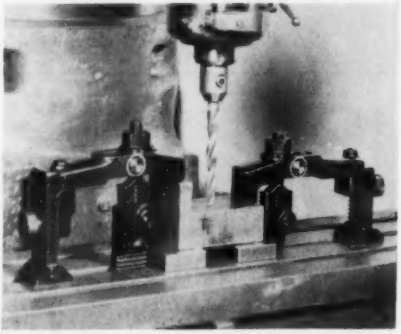

Hi-Lo Strap Clamp Assembly in use

The HEIMANN MAGNETIC

CHIP REMOVER

THIS HAND IS IN THE CHIPS! Yes, and the chips are *not* in your eyes or hair or ways of machines. The Heimann Magnetic Chip Remover gets chips out of blind holes rapidly, cleanly, safely. It's a lastingly efficient, permanent magnet in a knurled aluminum holder. Send it in after chips and it comes out covered with them.

YOU CAN'T AFFORD to be without it! A natural for your tool box or crib. Made ⅛" to ½" sizes, at a price to attract. Write now for circular.

HEIMANN MFG. CO.,
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EXTRA LARGE
SUB-TABLE

Made expressly for the No. 2 Moore Jig Borer, precision ground. Table measures 4" High x 10" wide x 28" long. By using this large table you avoid using extension parallels.

Available for immediate delivery at $250.00 each, F.O.B. Westfield, Mass. Terms 1% 10 days, net 30 days.

Also 6" x 6" x 6" EXTRA HEAVY ANGLE IRONS precision ground inside and outside (no ribs) to .0003 at $39.50 each.

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BUY THE BEST FOR LESS!

Queen City

grinders and buffers

You save when you buy *and* when you use QUEEN CITY Grinders and Buffers. Priced 20 to 30% under competing tools, they're built to stand up under the hardest use. Extra heavy spindles, extra duty ball bearings and special motors all contribute to long, low-cost service. 30-Day Trial Offer!

There is a complete range of QUEEN CITY Grinders and Buffers . . . floor and bench types . . in sizes from ⅓ to 10 H.P.

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new shop equipment . . .

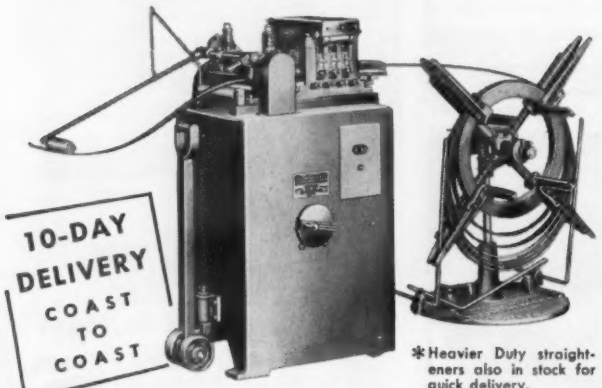
ELECTRIC FURNACE WITH SILICON-CARBIDE HEATING ELEMENTS

The L and L Manufacturing Co., Chester 71, Pa., has announced a line of high temperature furnaces. The furnaces were designed for operation to 3,000 degrees F. flash heats in oxidizing or neutral atmospheres, 2,850 degrees F. continuous operation in oxidizing or neutral atmospheres, 2,500 degrees F. continuously in reducing atmospheres.

These units were designed for the higher temperature requirements of new processes. They are suitable for laboratory and production use in the firing of ceramics, cermets, metallic oxide work, heat treating of metal, sintering and other high temperature work in either oxidizing, reducing or neutral atmospheres.

The illustration shows the Model SCVH 181260. This unit has a usable firing chamber 18 inches wide by 12 inches high by 160 inches long. Insulation is multi-layered and the primary insulating brick can operate at 3,200 degrees F. The interior of the furnace, as well as all door and door seal surfaces, are coated with a very hard, tightly adherent alumina surface. The hearth is of alumina which is supported on uniquely designed hearth supports which allow the greatest possible radiation on the under side of

STRAIGHTEN COIL STOCK
from ½" to 8" wide...
from .018" to .065" thick...
on a LITTELL "308"*



10-DAY DELIVERY COAST TO COAST

*Heavier Duty straighteners also in stock for quick delivery.

Littell "308" Variable Speed Straighteners flatten coil stock...synchronize feeding of stock with speeds of automatic presses . . . simplify hand feeding. The "308" has brought new speed, efficiency and economy into stamping, blanking and shearing operations from coast to coast. Get full details on these portable straighteners.

Write for Catalog Section "C"

F. J. LITTELL MACHINE CO.
Speed with Safety

ROLL FEEDS • COIL CRADLES
STRAIGHTENING MACHINES
REELS • AIR BLAST VALVES
District Offices: Detroit, Cleveland

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REPRINTS AVAILABLE

The following reprints are available free of charge in limited quantities upon letterhead request to this magazine:

"Grinding Jet Blades by Abrasive Belt Method"

"Automatic Drill Feeds Speed Production"

"Forming Aerodynamic Structures"

"Modernize Your Shop and Save Money"

"Producing Critical Airplane Control Components"

"Chill-Shunt Tooling in Tungsten Arc Welding"

"Clinometers and Their Application"

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modern machine shop

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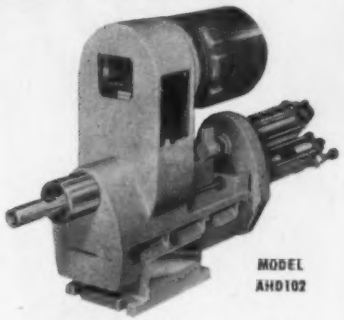
GOTHA

PRODUCTION MACHINE TOOLS

Automatic Air-Hydraulic Drill Units



Capacity ⅛" to ⅝" drill
4" or 6" stroke, #2 M.T.

A note on your letterhead will bring full details.

GOTHA, INC., Box 430A, Harvey, Ill.

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AUTOM

CONTINUOUS HINGES

Manufactured by

AUTO MOULDING & MFG. CO.

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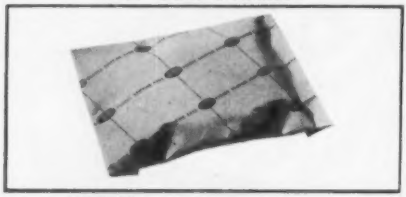
WHY YOU SHOULD USE

JIFFY PADDED SHIPPING BAGS for Your Product



➔ **SPEED**—Nine seconds is all it takes to pack a product for shipment. Insert item—staple or tape. It's ready to go!

➔ **PROTECTION**—Thickly cushioned, inexpensive Jiffy Bag is all the protection your product needs. It takes the place of boxes, fillers, overwraps.

➔ **ECONOMY**—You can save up to 76% packing time by switching to JIFFY BAGS. Eliminate overtime. Meet delivery schedules with money-saving, time-saving JIFFY BAGS.

Write today for samples and prices.

JIFFY MANUFACTURING CO.

377 FLORENCE AVE., HILLSIDE, N. J.

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new shop equipment . . .

the hearth. This contributes to very even hearth temperatures.

The elements are of silicon-carbide with low watt density. Door design is of the power lift type with a safety latch.

Case construction is welded and gasketed for atmosphere retention. The unit is complete with a transformer which, in combination with the furnace circuitry, provides eight zones of input control, four to the elements under the hearth and four to the elements above the hearth. Each zone is controlled by means of two six point tap switches providing 36 increments of voltage change. By this means, very accurate control over the firing chamber gradients is claimed to be provided.

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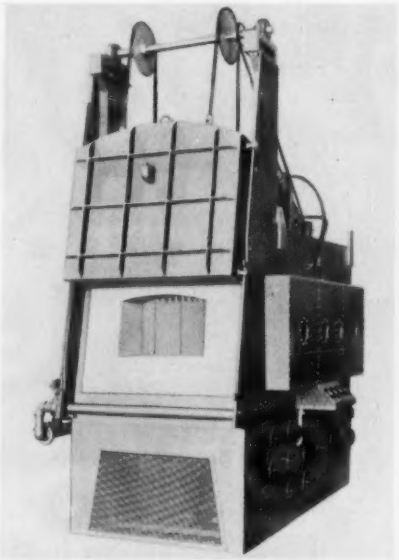

L and L Super-Temp Electric Furnace

LEIGH Pocket Tools

No. 787 Carbide and Steel Scriber $2.50

Points reverse for personal safety. Approximately ½"x3/64" dia., solid carbide rod brazed into steel (*not just tipped*) permits many regrindings.

No. 634 Combination Scriber and Permanent Magnet $2.25

EXTRA POINTS

No. 676-D—Carbide straight ..... $ .75
No. 676-A—Carbide 90° angle $1.00
No. 787-D—High Speed straight ..... $ .50
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Postpaid with money order or check.

SPRING SPECIALTY CO.
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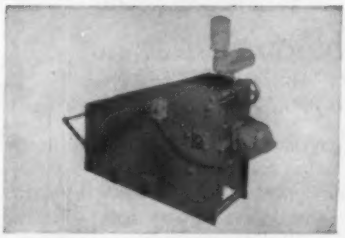
economically priced press room equipment



DURANT "SURE-DRIVE" COIL CRADLE

Easy to load trouble free performance provides constant slack loop for feeding presses, forming rolls, shears, slitters, etc. Available in 11 models wide variety of capacity O.D. maximum ranges 36" to 48" and width maximum ranges 10" to 20".

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DURANT Tool Supply Co.
PROVIDENCE 3, RHODE ISLAND

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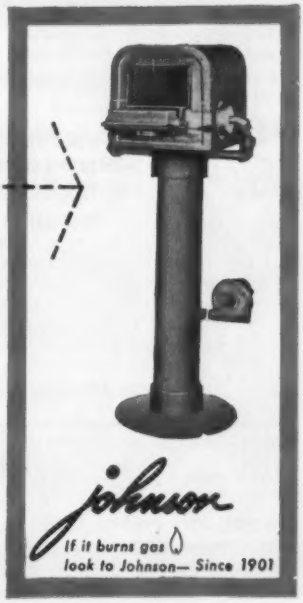
1500° in 5 minutes
2300° in 30 minutes



johnson **NUMBER 120 HI-SPEED FURNACE**

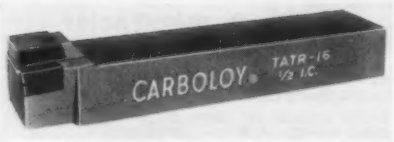
That's the kind of quick heating action you get with this compact, powerful furnace. It's economical to operate, too. Fast heat-up saves time and gas. High-temperature insulated firebox, 5" by 7¾" by 13½" gives even hardening of high speed and carbon steel dies, tools, and small parts. Temperature easily regulated. G.E. motor and Johnson Blower included. 120,000 BTU's per hour.

Pedestal style, F.O.B. Factory $184.00
No. 120 also available in bench style.
Write today for free Johnson catalog

JOHNSON GAS APPLIANCE COMPANY
571 E Ave., N.W., Cedar Rapids, Iowa

For more data circle 501 on Postpaid Card

TOOLHOLDER FEATURES ONE PIECE AUTOMATIC CHIPBREAKER CLAMP



Carboloy Lift-O-Matic Toolholder

A line of Carboloy Toolholders, featuring a one piece chipbreaker clamp that functions automatically, has been announced by the Metallurgical Products Department, General Electric Co., 11163 East Eight Mile Rd., Detroit 32, Mich. These toolholders, called Lift-O-Matic, also include a clamp screw, which is accessible from top or bottom, and a clamp color coding for quick identification.

Other features include a unique carbide surfaced chipbreaker that eliminates braze failure, a high strength heat treated shank, a solid carbide insert seat, only five replacement parts and a smooth, unobstructed chip flow. For economy, sturdiness and simplicity of operation, the holders have only five parts. These are standardized in order to keep inventory of replacement parts at a minimum.

The clamp and chipbreaker are combined into one unit, which lifts or lowers automatically as the clamp

Finest of ALL Local Lighting Units
FOSTORIA LOCALITES
with Amazingly COOL
HEAT VENTILATED REFLECTOR

★ Equipped with marvelous new collar-disc arm joints.

MODEL 55-VCX-701
$8.93 EACH
in Std. Pkg. of 4

A MARVELOUS SEEING TOOL FOR FASTER BETTER WORK
Direct light exactly where needed. Frictional arm and collar disc joints give flexibility of a thousand positions. Rugged construction, heavy duty socket, Levolier switch, universal base.

INNER SHIELD ACCESSORY
for extreme coolness when using 100-watt lamp.

WRITE for complete catalog of Localite Models for every industrial use.

THE FOSTORIA PRESSED STEEL CORPORATION, FOSTORIA, OHIO
Localites are available through wholesalers everywhere.

LOCALITE Fostoria for Light ON the Job

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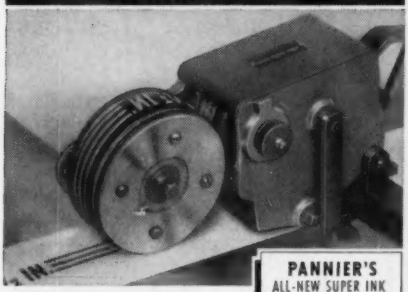

PANNIER'S
ALL-NEW SUPER INK
PRINT-ALL

Internally fed unit.
Use inks from semi-paste to liquid, including light colored, heavy pigmented inks.
Continuous or repeat printing.
No stopping to add ink.
Print on 1" centers with multiple staggered units.

Super Ink Print-All clearly marks all conveyed materials traveling horizontally or vertically. It prints top or bottom surfaces as material moves under or over the printer.

Write for complete data.

MARKING DEVICES
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Offices: Los Angeles • Chicago • Cleveland • Philadelphia
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19 MODELS *Write for catalog*
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ALORIS
QUICK CHANGE
TOOL POSTS & HOLDERS
Speed Your Operation .... Save You Money

Only a second to change tools for turning, facing, drilling, boring, threading, knurling, cutting off or any other operation.

- GREAT REPETITIVE ACCURACY.
- RUGGED CONSTRUCTION.
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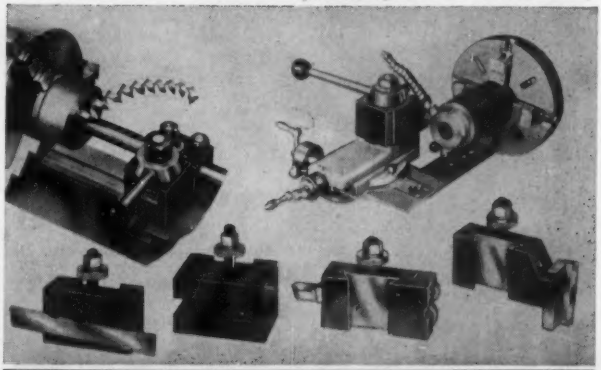
- GREATER RIGIDITY.
- SAVES 90% IN SET-UP TIME.
- UNCONDITIONALLY GUARANTEED.

Write for catalog and price list.



ALORIS TOOL CO., INC. 419 GETTY AVENUE CLIFTON, NEW JERSEY

For more data circle 505 on Postpaid Card

screw is turned. The clamp has been designed to move up or down on the clamp screw in order to eliminate the problem of sticking in the shank. Indexing is claimed to be both fast and easy from any position because the clamp screw is accessible from either the top or the bottom of the holder.

The chipbreaker clamp has a carbide coat, fused right to the chipbreaker surface, to eliminate braze failure.

In this one piece clamp design the chipbreaker is held at a fixed distance from the cutting edge for positive chip control. Machine operators cannot accidentally alter chipbreaker width.

To satisfy a wide range of operating conditions, standard clamps come in chipbreaker widths for light, medium and heavy cuts. Each clamp is color coded so there is no confusion in the crib or shop.

"Close to nose" clamping in all Lift - O - Matic Toolholders is claimed to prevent tilting and possible cracking of the insert under heavy cutting conditions. Clamping pressure starts as near the tool nose as possible. When the clamp is completely tightened, maximum pressure is exerted along the full length of the insert's cutting edge.

The insert pocket of the holder has been designed so that the top of the insert is slightly above the shank surface. In this manner, the clamp holds

CHICAGO DREIS & KRUMP

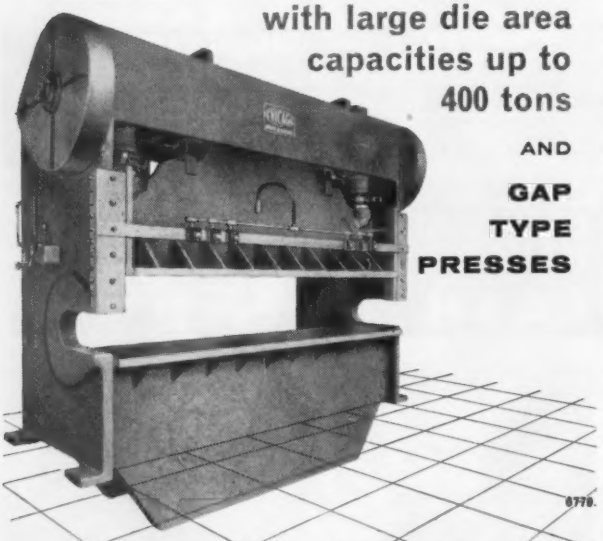
PRESSES

STRAIGHT-SIDE TYPE

with large die area capacities up to 400 tons

AND

GAP TYPE PRESSES



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Press Brakes • Straight-Side-Type Presses • Press Brake Dies

Hand and Power Bending Brakes • Special Metal-Forming Machines

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WALLS TU-WAY BELT SANDER

USE IT EITHER WAY

Full ½ h.p. G.E. Motor

VERTICAL

At last, a top quality industrial sander that provides all the most wanted features – yet sells for so little. **$89.95** complete with cord, plug, switch ready to use

Illustrated Literature on Request
A few desirable distributor territories still available.

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NIBBLE Your COSTS WITH...

SAVAGE NIBBLING MACHINES

- TUBE CUTTING
- CIRCLE CUTTING
- STANDARD NIBBLING
- FREE-HAND or TEMPLATE CUTTING
- SPEED WITH ACCURACY NO SECONDARY OPERATIONS
- SPEED WITH SAFETY NO OPEN FLAME OR SPARKS

Up to ¾" Capacity in MILD STEEL

QUOTATION ON REQUEST

W. J. SAVAGE COMPANY
SINCE 1889
KNOXVILLE TENNESSEE
NIBBLING MACHINE PIONEERS

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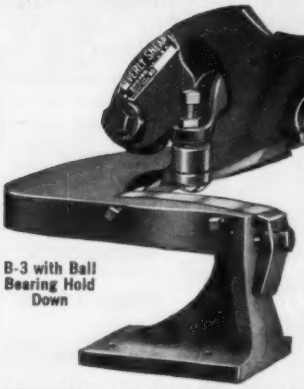
Beverly THROATLESS SHEAR

Cut any Shape... STRAIGHT OR IRREGULAR



B-3 with Ball Bearing Hold Down

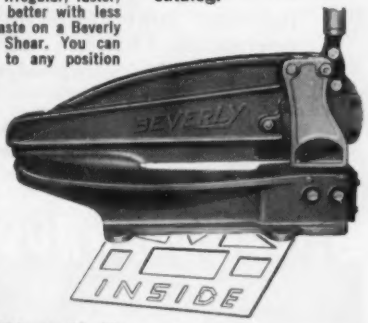
Make any cut — curved, straight or irregular, faster, easier and better with less material waste on a Beverly Throatless Shear. You can turn work to any position and make a clean cut as you go. Handles heavy gauges with ease—lighter metals without distortion. 4 models — capacities 18 gauge to 3/16" mild. All shears equipped with H.C. H.C. Blades for cutting Stainless.

INSIDE SLOTTER

8" Reach — 16 ga. cap.

Makes inside slotting cutting faster, easier, cleaner. Punch and die arrangement of 5 blades assures accuracy, clean cutting action. Cuts 2½"x⅛" slot at one stroke. Throat design permits pivoting work at any point in stroke for special inside cuts. Note sample cuts at left.

See your Beverly Dealer or write for illustrated catalog.



BEVERLY SHEAR MFG. CO., 3000 W. 111th St., Chicago 43, Ill.

For more data circle 509 on Postpaid Card

the insert positively, because the clamp itself does not touch the shank. Unused insert cutting edges cannot chip from contact with the insert pocket walls.

Lift-O-Matic Toolholders offer minimum chip interference. Shoulders are cut away for smooth, unobstructed chip flow, particularly important with light cuts. There are no projections to interrupt chips. Depth of cut is limited only by the insert.

The insert rests on an impact resistant carbide pad that is screwed to the holder to keep it from falling into the chip pan. This pan provides additional carbide material for efficient distribution of heat and loads to prevent deformation of the shank. Because the pad, or seat, is made of solid carbide, harder grades of inserts may be used in many cases for increased production.

For more data circle 81 on Postpaid Card

★ mms ★

STUDS

Northwestern Tool and Engineering Co., 119 Hollier Avenue, Dayton 3, Ohio, is now marketing studs, made from Stressproof steel. The manufacturer claims that this material Rock-

Northwestern Studs

YESTERDAY'S PIONEER . . . TODAY'S LEADER

Patent Applied for

WELDON

COUNTERSINKS *and* DEBURRING TOOLS

60°-82°-90°-100° ANGLES . . . . CHATTERLESS

These tools include cutting diameters ranging from 1/4" to 3".

Greater ease in cutting and longer life are the outstanding features of these WELDON tools for countersinking and deburring operations. Chatter is eliminated because of the single cutting edge. One trial will convince you.

Write for further details

Weldon Distributors throughout U.S.A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY

3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

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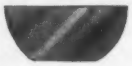
MARK OF QUALITY

STANDARD

WOODRUFF KEYS



We manufacture a complete line of Woodruff keys in all standard sizes. These sizes range from as small as ½" x 1/16" to keys as large as 3½" x ¾". All keys are carefully checked for burrs, slivers, etc., before being shipped to you. Only the finished tested keys are permitted to leave our plants.

We carry a complete stock of high quality, dependable keys. Send for our catalog for complete information on Woodruff keys, taper pins, machine keys, and machine racks.

STANDARD STEEL SPECIALTY CO.
BEAVER FALLS • PENNSYLVANIA
Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 511 on Postpaid Card

MORRISON 1" AUTOMATIC KEYSEATER

Investigate the many features of this new Keyseater. It has automatic feed, automatic stop to cut off feed at given depth, automatic relief to back the work away from the cutter, automatic centering, automatic lubrication and no bushings required.
Write for more information on the finest Keyseater on the market.

THE D. C. MORRISON CO.
P. O. BOX 10178 • CINCINNATI 1, OHIO

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Walton-American

THE "MULTI-POSITION" TOOL HOLDER

with 8 positions in ONE

This versatile Tool Holder *will reduce your tool expense.* Only ONE will replace many standard types. Its swivel head, giving perfect grip, will position around an entire circle.

The Walton-American will *reduce your labor cost.* All changes can be made at the machine, eliminating lost time for trips to the tool room.

Economy is doubly assured for jaws will not break high speed tool bits . . . and very short bits can be used. The capacities of four sizes range from 1/8" to ½".

Take advantage of Walton's 30-day-free-trial to investigate these savings in your shop. Write THE WALTON COMPANY, Hartford 10, Conn., for Data Folder No. 10.

SINCE 1908 WALTON TOOLS W HARTFORD, CONN

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new shop equipment . . .

wells 25C, can be machined or threaded as easily as cold rolled steel. It has a tensile strength of 125,000 p.s.i., and a minimum yield strength of 100,000 pounds per square inch.

These studs are now available from stock in ¼ through 1 inch diameters. They range in length from 1½ to 20 inches. They will assure the user of long life through their unusual fatigue and wear resistance. Problems often associated with quenched and tempered steel are said to be eliminated with this "strength in the steel" stud.

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★ modern machine shop ★

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Trico Fuse Manufacturing Co., Milwaukee, Wis., has developed a chain oiler for automatically applying a film of oil to chains, gear, slides or irregular surfaces. Oilers can be mounted at any convenient location and oil is released by gravity from the reservoir, either manually or electrically, to oil

Trico Chain Oiler

"FISKE'S DARL BASE IS THE BEST ALL-ROUND CUTTING OIL I'VE FOUND"

FISKE'S "DARL" OIL is a base cutting oil for use in working both ferrous and non-ferrous metals. Can be used straight or reduced with mineral oil to suit the metal and work. Non-corrosive. Permits visibility when mixed. Has exceptional anti-weld properties, lubricity and film strength. For better finish of product and longer tool and die life, use "DARL."

Bulletins describing Fiske's Darl Base Oil and other specialty lubricants and coolants sent on request.

FISKE'S Since 1870

METAL WORKING LUBRICANTS

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Plants: Newark 5, N. J. and Toledo 5, Ohio

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ACME

TAPS

from Stock!

Immediate shipment from factory stock, 3/8" to 3" diameters by eighths.

Write or wire for catalog prices, or for quotes on specials.

H&R 30
The Threading Specialists

HORSPOOL & ROMINE
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HELIOS
PRECISION DIAL CALIPER

6"
$31.80
F.O.B. New York

Guaranteed Accuracy Within .001"
Reading .001"

- SPEED
- PRECISION
- DEPENDABILITY

Full scale readings of 5"-6"-8"-10" available. Also Foot with Scriber to convert to Vernier Height Gage.

Ask for catalog and prices of other Standard Calipers.

NEISE MODERNTOOLS
KARL A. NEISE
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● *Centerless Ground to extreme accuracy. Special new-type Equipment, assures concentric chamfered or formed ends—no cut-off burrs.*

Dowel - Straight - Countersunk - Angle Ends
.020" to .1875" Diameter
.125" to 2" Length

Precise Specifications
Accurately met. Surface analyses tape, showing typical surface in micro-inch measurements, is included with each job. Tape magnifies 39,370 times.

Small orders or volume production to your exact specifications.

Quality Precision Work!
Prompt Deliveries!
Prices you will like!
SEND US PRINTS FOR QUOTATION

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new shop equipment . . .

applicators. Precision needle valves on the dispenser, which require no further attention after initial setting, meter just the right amount of oil to applicators. Various manifolds are also available which can be connected in series so that only one dispenser is needed for as many as 12 outlets. For limited or hazarous locations, dispensers can be mounted at a distance from the area to be lubricated, oil being supplied by means of plastic or copper tubing to the manifolds and applicators.

The specially designed applicators, which are not ordinary bristle brushes, withstand temperatures up to 275 degrees F. and can be trimmed to any width to avoid overhang and consequent side dripping. They do not spread or become distorted, therefore constant rotating of the applicators for even wear is unnecessary.

Trico chain oiler reservoirs and sight fittings have crystal clear Pyrex glass or shatterproof Lucite cylinders so that the oil supply is always visible.

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★ mms ★

DRILL CHUCK

A one inch capacity drill chuck with special features has been announced by Oneida Machine Tool

Westcott Drill Chuck

how to trap dust

that damages your machines and hurts company morale

Easy-to-move

TORIT

dust collectors trap dust at its source!

Untrapped dust costs money: "secretly" forces precision machines out of line, limits production. Torit dust collectors are unitized for custom installation—save more money, usually more efficient than central (built-into-building) system. Torit unit operates only when machine or combination of machines it protects are on. Filtered air may be returned to room to save heat. Many models and sizes, all self-contained, easy to move. Write today to . . .

TORIT manufacturing co.

Dept. 701, 296 Walnut Street, St. Paul 2, Minn.

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Handle your small part precision JIG BORING on the

LINLEY JIG BORER

Why tie up your big, costly jig borers on small work when you can get maximum utility at less cost per hour on a machine exactly fitted to your work. Put your small work on the LINLEY where it belongs and reserve your large machines for large work, where large work belongs. You'll save money this way.

Complete details sent promptly on request

Specifications
Table Movement:
6" x 10"
Table Size:
7" x 17½"

LINLEY BROTHERS CO.
661 State St. Ext.,
BRIDGEPORT 1, CONN.

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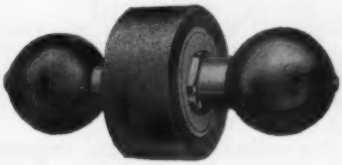
THE *Original* METCALF GRINDING WHEEL DRESSER



BALANCED
FAST—COOL CUTTING ACTION—
HIGH SPEED WHEEL FORMING and CRUSHING

COMPLETE ASSEMBLY $7.95
EXTRA WHEEL $1.50

Made by the World's Largest Manufacturers of SAW SHARPENING and KNIFE GRINDING MACHINERY

HANCHETT MANUFACTURING COMPANY

Main Office	West Coast
Big Rapids, Michigan	Portland, Oregon

For more data circle 520 on Postpaid Card

NEW DRILLS FROM OLD WITH NU-TANGS

NU-TANGS CUT DRILL REPLACEMENT COSTS!

We return them like this!

Send them to us like this!

Send us your old drills—we'll make them new again at a fraction of the cost of a new drill! Exclusive NU-TANG* process replaces twisted or broken tangs with brand new tangs of correct size — and with GUARANTEED ORIGINAL STRENGTH. No welding—No distortion —No shortening of drills—No sleeves.

Any drill, reamer, or other tool with a Morse taper in sizes 2 to 6 can be repaired perfectly this quick new way. Delivery—One week. Used by many leading industrial plants. Amazingly low cost—satisfaction guaranteed! Send for complete information.

* Patent No. 2,512,033

NU-TANGS INC. 1335 Bates Street Cincinnati 25, Ohio

write today

For more data circle 521 on Postpaid Card

new shop equipment . . .

Corp., 700 East Walnut St., Oneida, N. Y. This heavy duty two jaw Westcott Chuck is guaranteed to hold true and firm, yet not injure the shank of the drill.

Streamlined in design, the chuck has no projecting jaw. The steel cap on the face of the chuck eliminates the danger of larger drills being used and adds strength to the chuck body.

The hole in the hub has been tapered to take an arbor, but it can be bored out and threaded to fit a template of the spindle on which it is to be used.

The jaws are made of tool steel, carefully machined, tempered and hand fitted to the body. The operating screw is made of special alloy steel and is heat treated for toughness.

For more data circle 84 on Postpaid Card

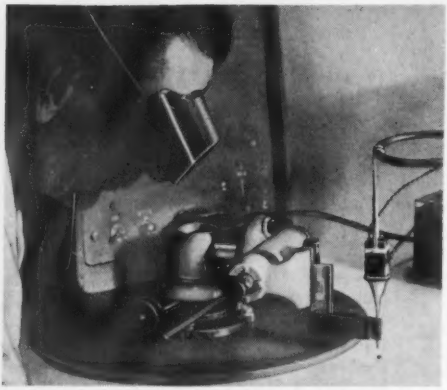
TWO DIMENSIONAL DUPLICATING ATTACHMENT FOR MILLING IRREGULAR CONTOURS

The U. S. Vertical Milling Machine may now be equipped with a two dimensional table and saddle Turchan duplicating attachment, ideally suiting the machine for following irregular shaped contours. According to the manufacturer, the U. S. Burke Machine Tool Division, 30 Brotherton Rd., Cincinnati 27, Ohio, the combination of the U. S. Vertical's unusual capacity with the hydraulic two dimensional tracer greatly simplifies intricate profiling and contour machining.

The 20 by 10 inch duplicating attachment is complete with pencil type stylus. The operator holds the stylus in contact with the ferrous or non-ferrous master; the U. S. Vertical automatically follows the prescribed movements in both horizontal planes at the predetermined optimum feed rate.

★ ★ ★ ★ ★

People work better when they SEE BETTER®



Lockheed Aircraft Corp., Missile Systems Div., uses MAGNI-FOCUSER to watch Ultrasonic Drill making holes five thousands of an inch, the size of human hair.

For increased production, greater accuracy, fewer accidents and errors, use the MAGNI-FOCUSER—the new 3-D binocular magnifier with matched prismatic lenses. It provides needle-sharp vision — *greatly magnified* and in *third dimension.*

Scores of industrial jobs are being aided by the MAGNI-FOCUSER. It reduces eye strain and avoids squinting; leaves both hands free to work. It's light weight; can be worn with or without eye glasses; normal vision resumed simply by raising the head.

Speed your production by ordering now on 10-day trial basis without obligation. Only $10.50. Immediate delivery. Or write for illustrated folder.

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EDROY PRODUCTS CO., Dept. P, 480 Lexington Ave., New York 17, N. Y.

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A SPECIALIZED CAM MILLING SERVICE.
JIG BORING
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EXPERIMENTAL DEVELOPMENT

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For All Lathes—Old or New—
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LOOK AT ALL THREE

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A FEW PIECES
—at Experimental or Pilot Stage

NO DIES! Our machine cut method, applying custom-built slitters, cutters, saws, files and stock punches—PLUS special techniques and skills—produce small quantities at very low cost.

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TEMPORARY LOW-COST TOOLING! To produce something more than a few, but less than high production quantities, our simple contour dies—PLUS special purpose presses—keep costs low.

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MODEST DIE CHARGES on larger quantities! Here is where our regular production toolings apply to advantage . . . to deliver high quantity Stampings, and at lowest possible unit cost.

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"One Piece or a Million"

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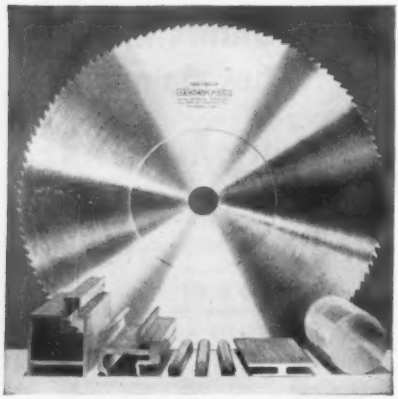

Finest edge holding—qualities of any saw

DISSTON

DISS-CROLOY CIRCULAR SAW

For non-ferrous metals and plastics

Maximum hardness combines with toughness! Disston Diss-Croloy Circular Saws are scientifically heat-treated for hardness. For toughness, they're made of high-carbon, high-chrome steel. That's how Disston can give you a saw with superior edge holding qualities.

Reduced sawing costs! Disston Diss-Croloy Circular Saws last longer. Need less frequent sharpening than other saws. Reduce downtime. And—you get more and better cuts from each blade.

Fast, prompt delivery! There's no long wait for a Disston Diss-Croloy Circular Saw! Large stocks are always on hand. Diameters in stock range from 6" to 16". Other diameters are also available.

Disston Division, H. K. Porter Company, Inc., Phila. 35, Pa.

H. K. PORTER COMPANY, INC.
DISSTON DIVISION

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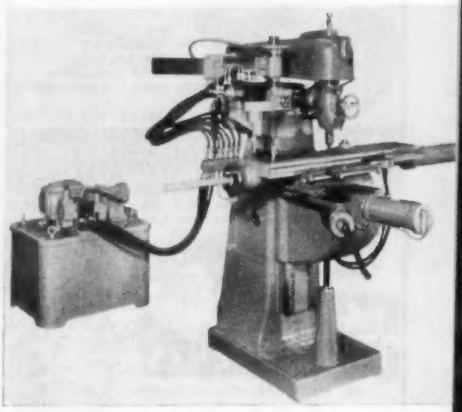

U. S. Vertical Milling Machine equipped with two dimensional duplicating attachment

To facilitate setup, the longitudinal table feed screw is retained, permitting manual longitudinal table movement in any position. An anti-backlash longitudinal table feed nut is provided to assure continuing accuracy of operation.

Range and capacity of the U. S. Vertical Mill are said to be in no way limited by the duplicating attachment. The machine illustrated has a 10 by 42 inch table and offers a choice of 24 different spindle speeds in a range from 65 to 2,850 r.p.m. It handles a wide range of parts and materials.

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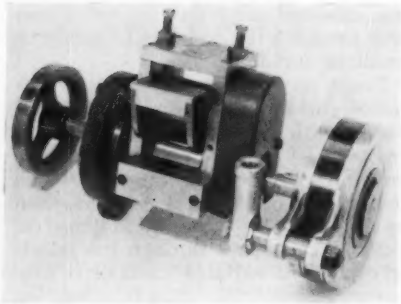
ROLL FEED FEATURES SEVERAL IMPROVEMENTS

Durant Tool Supply Co., Providence 3, R. I., has announced that it has added seven new sizes as standard



Durant Improved Model No. 0 Roll Feed

models and certain new features and refinements to its complete line of roll feeds.

A larger handwheel has been added so that easier starting of material through the rolls can be effected. A new type ratchet brake is now standard on all models. This makes possible easier brake adjustment and more accurate feeding. Rolls are now supplied either hardened and ground or knurled, as required by the customer, at no extra cost. A new type tool steel is now being used in the ratchets of the Selectomatic Indexer on the roll feeds to minimize wear and give long life. The design of the top roll tension springs has been changed to give long life and to give greater top roll adjustment for thicker material.

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AUTOMATIC CYCLING DRILL PRESS

Secrest Machine Co., 1507 M St., Northwest, Washington 5, D. C., recently announced the introduction of its line of High Speed Automatic Cycling Drill Presses. These machines are unique in that spindle speeds, feed

KUTMORE ADJUSTABLE HOLLOW MILLS

A MIGHTY MIDGET!

This Midget Floating Holder Hollow Mill, flange type, has micrometric adjustment, and is designed to permit easy compensation for any spindle misalignment. Small, sturdy, extremely accurate!

WRITE FOR CATALOG 20MM

It shows complete line of adjustable hollow mills. Our Engineering Dept. is at your disposal for special requirements.

CARL WIRTH & SON, INC.
1625 CLINTON AVE. NO. ROCHESTER 5 NY

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range, stroke, feed stroke and rapid approach are infinitely variable. They are equipped with Morris Air-Oil-Matic drill heads, providing complete automatic cycling with fast approach and fast return for drilling or tapping and positive stop with adjustable time delay for such operations as spotfacing, counterboring and so on. These drill presses are furnished in single or multiple spindle models.

Feeds and speeds are infinitely variable and are easily and quickly adjusted with controls located convenient to the operator. Each spindle has an individual control station by which the type of operation is selected, then by pushing the start button the drill automatically goes through the selected cycle. The variable speed drive provides infinitely variable spindle speeds with maximum spindle speed of 8,000 r.p.m. available on the standard machines. The customer may choose the range of spindle speeds from 17 different ranges, and the speeds within that range

Secrest Automatic Cycle Drill Press

CUT DRILLING COSTS

with the

Bellows

DRILL PRESS FEED

Attaches to the star wheel shaft of any drill press. A touch on the handle sends the drill rapidly to the work, hydraulically feeds through the work, automatically returns to start position. Air-powered, electrically controlled. Feed adjustable to meet needs of any tool working in any material. Install it in half an hour; it will pay for itself in half a month.

Detailed specs in 16 page Bulletin

Tells how you can cut cost in all kinds of drill press operations with this versatile feed unit. Write Dept. IEN-158, The Bellows Co., Akron 9, Ohio. In Canada—Bellows Pneumatic Devices of Canada, Ltd., Toronto 18. Ask for Bulletin MMS-158.

The Bellows Co.

DIVISION INTERNATIONAL BASIC ECONOMY CORPORATION

AKRON 9, OHIO

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COMBINED DRILLS

and COUNTERSINKS

● Both old and new series carried in stock for immediate delivery. Finest high speed steel. Ground spiral flutes. New standard simplifies and improves size progression. New comparison chart mailed on request. Shows new standard sizes—both plain and bell type. Specials to your blue prints.

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25040 Easy Street, P.O. Box, Roseville, Mich.

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ARBOR & HYDRAULIC

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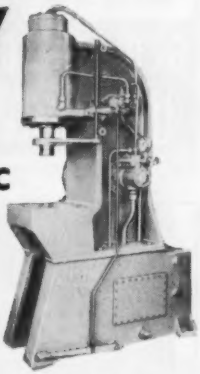
ARBOR Presses 1/4 to 20 TONS

75 YEARS

For 75 years, GREENERD has exclusively manufactured presses for production Assembling, Broaching, Forming, Straightening, etc., sold by Machine Tool Dealers and Mill Supply Houses.

GREENERD Presses may be furnished to J.I.C. standards.

HYDRAULIC Presses 2 to 75 TONS



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new shop equipment . . .

are infinitely variable with a ratio of 7 to 1 maximum to minimum spindle speed.

Multiple feeds and rapid approaches are available through the use of special feed dogs.

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NAMEPLATE MARKING

The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS.
- Simple Operation
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For more data circle 531 on Postpaid Card

DUST FILTER

The Roll-Clean Dynaclone Dust Filter retains the basic advantages of the original Dynaclone, while providing a more efficient method of cleaning collected dust from the filter bags, according to The W. W. Sly Manufacturing Co., Cleveland 1, Ohio.

The roller cleaner moves back and forth across the open ends of the filter bags, sealing each bag as it is being cleaned by atmospheric air. This cleaning air is brought into the filter by the main operating fan while the dust filter continues to operate.

Because of its simplified design, the Roll-Clean Dynaclone provides these advantages: (1) more cloth area and greater filtering capacity; (2) easy filter bag changing due to the elimination of the false wall in the clean air chamber; now any single bag can be removed without disturbing the other bags; (3) complete dust seal is provided by rubber rolls which block off the adjacent bags to prevent pick-up of dust dislodged from the bag being cleaned; the rolls automatically adjust for each row of bags; (4) easy access for inspection and servicing has been provided by doors at both ends of the dust filter and by access space in the clean air chamber.

The rolls are made of highly wear resistant gum rubber combined with an inner filling of sponge rubber. This construction provides maximum re-

WOHLHAUPTER MASTERHEAD

FIRST FOR HIGH PRECISION

Boring, Facing, Recessing, Undercutting, Underfacing, Turning, etc. IN ONE SET-UP WITH AUTOMATIC FEED AND AUTOMATIC END RELEASE.

- SAVES CONSIDERABLE TIME
- INCREASES PRODUCTION
- INCREASES EFFICIENCY
- PRODUCES BETTER FINISHED WORK WITH HIGHER PRECISION

9 sizes available for work up to 36¼". Multiple Feed Models have 12 Automatic Slide Feeds.
Also Automatic Tapercutting Heads for Angles 0-180°.

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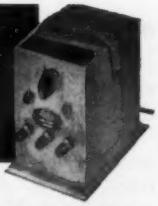
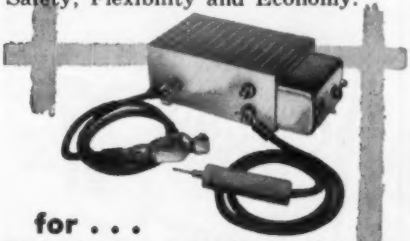


for . . .
PRODUCTION SOLDERING

Handles numerous soldering jobs from fine precision to medium-heavy industrial. More than 16 styles of electrode holders to fit individual soft or hard soldering operations.

From 6 to 30 stages of heat with a selector switch used in conjunction with 3 secondary terminals.

A wide range of power—5 to 2500 watts—quickly supplies concentrated heat at exact area—insures perfectly soldered joints with maximum Speed, Safety, Flexibility and Economy.



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ETCHING & DEMAGNETIZING

Marks the hardest steel, stainless steel, steel alloys or carbides with the ease and legibility of a pencil. 4 types of interchangeable marking points available to serve every purpose. 6 to 36 distinct marking heats. Easy to operate. Two tools in one. Demagnetizes over a 4 to 8-inch width. Especially valuable when tools have been in contact with magnetic chuck.

Write for New Catalog descriptive of all model Solder Tools, Etchtools, Demagnetizers . . . today.

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FOR YOUR CONVENIENCE

Miccro *Supreme Spray*

LAY-OUT DYE
(Purple)

A *new*, easy-to-use, dependable, spray Lay-Out Dye for tool, die, pattern, or template layout on metal. Dries instantly—shows up in sharp relief.

Also Still Available . . .

Miccro *Supreme*

LAY-OUT AND IDENTIFICATION DYE (7 Colors)

For layout on metal and quick identification of bar stock, sheets, strips, or parts. Also dries instantly and shows up in sharp relief. Available in brush-in-cap cans and larger containers.

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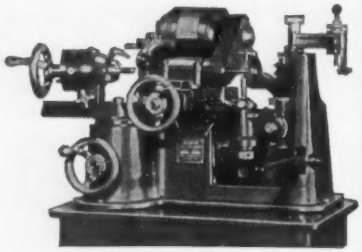
TAP GRINDER

Sharpens Chamfers, Flutes and Spiral Points



MODEL 1100

• Capacities No. 0 Machine Screw to 1½" Hand Taps.

HENRY P. BOGGIS & CO.
708 E. 163rd St., Cleveland 10, Ohio

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new shop equipment . . .

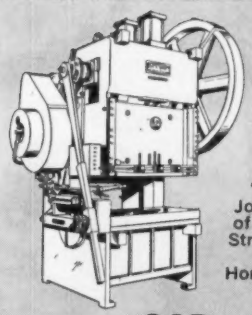
siliency as the rolls travel over the dust wall.

The light, rigid aluminum center core causes the rolls to press into the dust wall to provide complete seal at every point. Ball bearings at each end of the core maintain a smooth turning action with almost no friction.

A gearhead motor chain drive moves the rolls across the dust wall. Its low, 3 feet per minute speed also contributes to long life of all of the components. Eight wheel suspension of the roller cleaner carriage provides more wheel area for less wear.

For more data circle 88 on Postpaid Card

Cutaway view (top) shows dust entry into the Sly Dynaclone Dust Filter, passage of dust laden air through the filter bags, clean air exit to the single fan and hose through which reverse cleaning air is admitted to the roller cleaner. Close-up view (bottom) shows seal provided by rubber rolls



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Complete "specs" on Johnson line of Inclinable, Straight Side, Gap and Horn Presses.

GAP

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POWER PRESSES
JOHNSON MACHINE & PRESS CORP.
620 W. INDIANA AVE., ELKHART, INDIANA

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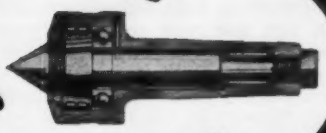
NIELSEN
Heavy Duty
Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

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ROYAL Self-Releasing Collets with Clover Leaf Grind

Royal specialization pays off. The new Royal self-releasing collets have won wide acclaim for their ease of handling and production savings. Specify Royal and get these plus features at no extra cost!

*Also Milling Machine Types 9B&S, 7B&S, 2MT, R8
*Special Collets Made To Order

Available in 5C, 3C, 3AT, 6AT

a new concept in COLLET DESIGN by ROYAL

- Real spring tension
- Wider opening
- No gauge fit for secondary operations
- Parallel bearing surfaces prevent wear
- No binding on closing and releasing
- Properly heat treated
- Made of selected steel
- Rigidly inspected

ROYAL PRODUCTS

Write or call today for literature and price list on Royal Self-Releasing Collets, Handwheel Draw Bars, and Spring, Step, and Milling Machine Type Collets.

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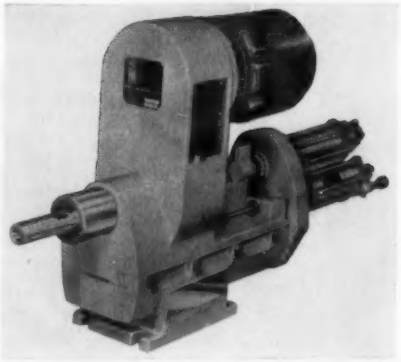
For more data circle 539 on Postpaid Card

new shop equipment . . .

AIR HYDRAULIC DRILLING UNIT

The development of an automatic drilling unit, for widespread use in the metalworking field where high production and low unit cost are essential, was announced recently by Gotha, Inc., Box 43, Harvey, Illinois.



Gotha Automatic Air Hydraulic Drilling Unit

The Gotha Drill Unit is a complete, self-contained, automation component which, on receiving a small momentary electric impulse, will perform a complete machining cycle—drill, ream, counterbore, spotface or tap any machinable material. Tapping may be done by the addition of a tapping head or by slight modification of the standard unit.

Reliability, accuracy and long life were primary objectives in the design of this drill unit. The rugged, simple, way type construction is said to eliminate a great many troublesome, expensive, moving parts. There are only two bearings in the entire machine

QUALITY ACCURACY COLLIS DURABILITY SERVICE

STANDARD TYPES

SLEEVES AND SOCKETS

NOW!

HEAT TREATED . . .

So popular with users.

COLLIS Heat Treated Sleeves and Sockets are manufactured by skilled workmen to give long durable service and extra long life. This type of sleeve has less chance of nicks and assures same accuracy with longer runs.

Call at once for our representative to explain about the Complete Collis Line of Lathe Centers, Arbors, Drill Drifts, and Magic Type Chucks as well as Sleeves and Sockets and Collets.

"Call Collis for Service"

THE COLLIS CO.

DEPT. A, CLINTON, IOWA

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GRIND THE

Eastern Centerless Way

WE SPECIALIZE

20 CENTERLESS GRINDERS

ESTABLISHED 1939

Eastern Centerless Grinding Co.

470 Tolland Street East Hartford 8, Conn.

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TRUE POINT DRILL SHARPENER

for Drills 41-60 and 61-80 R.H. & L.H.

A properly sharpened drill cuts faster — more accurately and is less likely to break.

Write for circular and full details.

UP-TO-DATE TOOL CO.

P. O. Box 99, Station A, Worcester 8, Mass.

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MADE TO YOUR SPECIFICATIONS

—Except Screw Machine Cams—

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

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For Your Convenience...

the "Where to Get It" section of MODERN MACHINE SHOP provides a quick reference to machinery, tools and supplies advertised in the current issue. Use it consistently. You'll find it's very helpful. (See pages 310, 312, 314, 316 and 318.)

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Adjustable

MULTI-DRILL

for *Production* Drilling

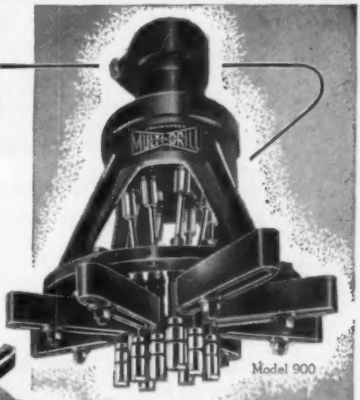
9" DRILLING AREA

AVAILABLE WITH 2 TO 8 SPINDLES

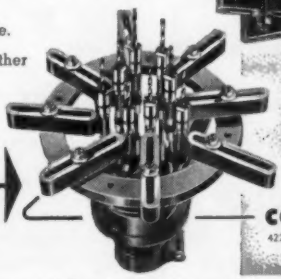
- Designed for accurate, high speed production drilling
- RUGGED CONSTRUCTION
- Quick, easy adjustments to **any** hole pattern on or within a 9" circle; ½" minimum center distances; Drill sizes ½" to 3/8"
- Special adaptations available.

MULTI-DRILLS are made in other sizes and models.

Write for details and name of your nearest Distributor.



Model 900



Locater arms are designed for fast, easy adjustment

Dependable Performance... proven by industry

FITS ANY DRILL PRESS

COMMANDER MFG. CO.

4224 W. KINZIE STREET, CHICAGO 24, ILLINOIS

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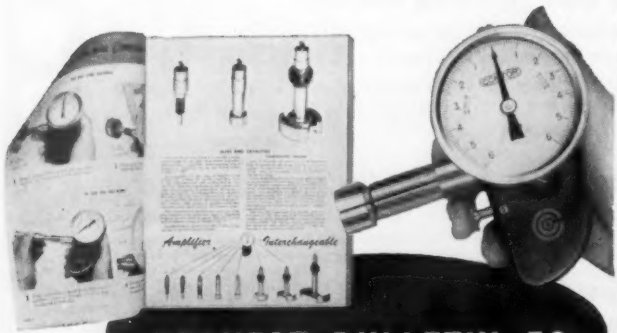
and these are prelubricated and sealed for years of normal service. Because no spline shaft is used, chatter and noise level during heavy drilling operations is reduced considerably.

The manufacturer states that capacity, versatility and ease of setup have in no way been compromised by the simplicity of the drill unit's design. Rapid approach, feed and rapid return of the spindle are all easily adjusted and infinitely variable. The depth stop and rapid approach check engagement are positive mechanical stops — eliminating the hazard of "crack ups" due to failures of electrical components such as switches and solenoids.

In order to maintain greater accuracy, off center spindle loading has cylinder, which pushes the spindle forward, directly in line with the drill spindle. This arrangement permits efficient thrust transmission to the drill and reduces wear on sliding surfaces. Rapid approach "arresting" and feed rate control are provided by a small, compact, sealed hydraulic check unit mounted parallel to, and independent of, the air cylinder. Because the air cylinder and hydraulic check unit are independent cartridge types, either can be removed and replaced in a few minutes when maintenance is necessary. Depth is controlled by a positive adjustable screw stop and micro switch.

For more data circle 89 on Postpaid Card

Makes precision internal gaging easy



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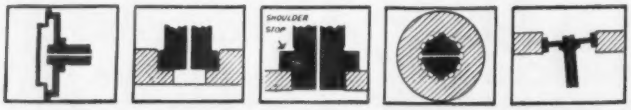
COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from 1/8" to 10" dia.

Investigate the gage used by thousands in jet propulsion, automotive transmission, household appliance and other volume-precision industries.

Just say "BULLETIN 50"

Comtor Co., 64 Farwell St., Waltham 54, Mass.

ALSO easily adaptable to SPECIAL PROBLEMS!



SHALLOW HOLES | BLIND HOLES | SHORT THRU HOLES | SPLINE ROOT PITCH | SPHERICAL HOLES

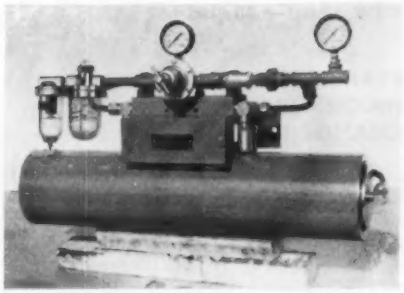
For more data circle 545 on Postpaid Card

EXTRA HEAVY DUTY PNEUMATIC BOOSTER PUMP

The Dayton Rogers Manufacturing Co., Minneapolis 7D, Minn., has announced an Improved Extra Heavy Duty Pneumatic Booster Pump. This Model H-6, which is a larger and improved version of the Model H-4, has a boost ratio of 2.5 to 1 and an output of 2.5 c.f.m. at 190 p.s.i. (32 c.f.m. free air) when using 80 p.s.i. input.

The unit need only to be connected to the shop air supply to enable it to automatically boost the normal 80 p.s.i. air supply to approximately 200 pounds per square inch.

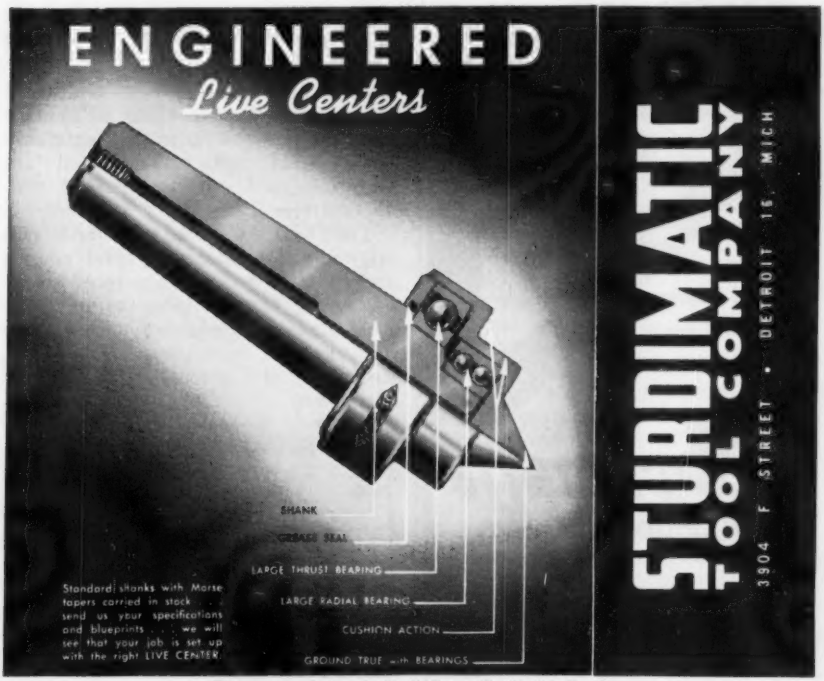
Output pressures of any desired value between zero and 2½ times shop line pressure can be obtained and controlled within plus or minus 5 percent of setting.



Dayton Rogers Improved Model H-6 Extra Heavy Duty Pneumatic Booster Pump

This pump is 32 inches long, 17 inches high and 13 inches deep.

For more data circle 90 on Postpaid Card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Standard shanks with Morse tapers carried in stock . . . send us your specifications and blueprints . . . we will see that your job is set up with the right LIVE CENTER.
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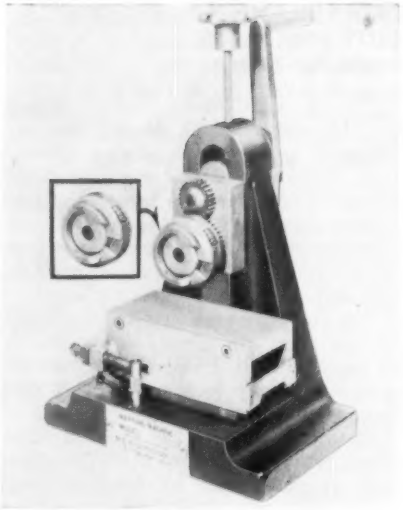
new shop equipment . . .

STAMPING FIXTURE INCORPORATES TYPE CHANGE FEATURE

The M. E. Cunningham Co., 1051 Chateau St., Pittsburgh 33, Pa., has announced that its Model GRD Stamping Fixture has been modified to include an improved and simplified type change feature. This will facilitate type changes during the stamping process and will make the fixture more adaptable for use in short production runs.



Cunningham Model GRD Stamping Fixture with simplified type change feature

The basic fixture was developed originally for stamping solid rounds and tubular products; but recent mandrel, cradle and table attachments have made it adaptable for such products as flat stampings, hex plugs, sleeves, conical pieces, long bar parts and channels.

A newly designed spring actuated ball lock feature now allows type to

Low Cost Automatic
HORIZONTAL STOCK REEL
Self-powered
24" dia. $85.00
30" $90.00
36" $95.00
Write for details

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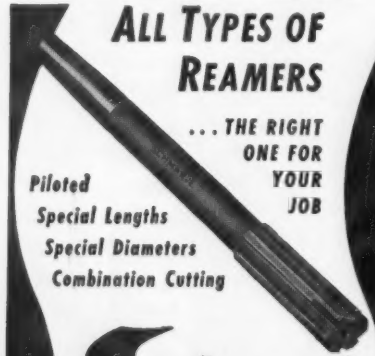
. . . THE RIGHT ONE FOR YOUR JOB
Piloted
Special Lengths
Special Diameters
Combination Cutting



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CARBIDE REAMERS
STRAIGHT OR TAPER SHANK
Send drawings for Prompt Quotations
SCHMARJE TOOL COMPANY
Carbide Reamers • Form Tools
MUSCATINE 3, IOWA
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Brown & Sharpe and Swiss Automatic screw machine parts, aircraft and standard, heat treated and ground if necessary. Send blue prints for estimates. 27 years serving industry. The Porter Machine Co., Cincinnati 9, Ohio.
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be changed easily during production runs. The knurled outer ring is moved ¼ of a turn, positioning the ring opening opposite the type. The device locks in the open position while type is removed and replaced, then it is returned to the stamping position, securing the type in place.

The GRD Fixture is composed of these components—steel housing and base; geared handle; marking roll; fine adjustment to control depth of lettering; as well as a table, mandrel, cradle or other assembly for holding the product being marked. As the handle is turned, the marking roll rotates and marks the piece on the table or cradle.

The marking roll can be made for one or two lines of type or logotypes. Type capacity depends upon the size of characters to be used.

For more data circle 91 on Postpaid Card

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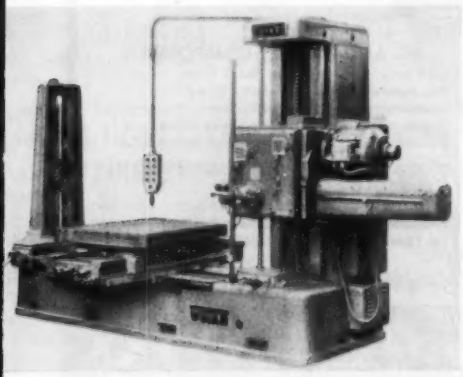
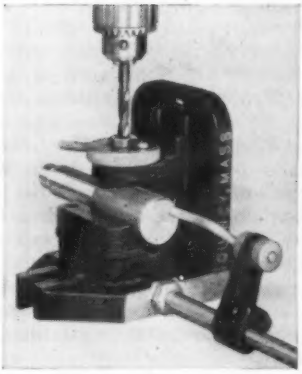
BORING MILL FOR BORING, MILLING, FACING AND SCREW CUTTING

The Index Industrial Corp., 150 Broadway, New York 38, N. Y., recently announced the Wotan No.



Wotan No. B85A Horizontal Boring Mill



NEW ADJUSTABLE DRILL JIG

eliminates layout; cuts drilling time

Used for drilling holes through round stock and hex stock from ¼" to 2" and cap screws from ¼" to 1¼", the new Mathewson Adjustable Drill Jig eliminates layout and can cut drilling time on small lots to a fraction. And it eliminates the costs of special jigs for larger quantities. Holes for cotter pins, set screws, drive pins for bayonet joints, oil holes in tubular sections, and wiring holes in cap screws, are all typical of the operations that can be done more economically with this jig. Hole diameters range from .052" to .531", using your A.S.A. standard slip bushings. The hardened V-block has two 60-degree V's for centering round or hexagonal stock, one for ¼" to 21/32" diameter, one for 21/32" to 2" diameter. Adjustable stop for locating work longitudinally for drilling any distance from end, may be used on either side. Adjustable bushing carriers hold slip bushings and clamp work securely. Jig highly successful in permitting use of inexperienced drill operators. For circular write to **Mathewson Machine Works,** 40 Hancock Street, Quincy, Massachusetts.

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B85A Precision Horizontal Boring Mill.

The Wotan B85A has the following features: power operated rotary table; nitrided roller bearing spindle; electro-magnetic clutches; rapid power traverse throughout; threading attachment; centralized lubrication and controls; vertical capacity of 36 inches; spindle outboard support of 86 inches; and speeds to 1,000 revolutions per minute.

Major specifications are as follows: diameter of spindle is 3⅜ inches; taper in spindle Morse No. 5; working surface of the table is 38½ by 41¾ inches; maximum distance from the spindle sleeve to the boring stay is 87 inches; number of spindle speeds is 21; number of feeds is 27; and rapid traverse is 8 feet per minute.

For more data circle 92 on Postpaid Card

COMBINED VERTICAL AND HORIZONTAL MILLING MACHINE

Aaron Machinery Co., Inc., Dept. M, 45 Crosby St., New York 12, N. Y., has announced the Abene Model VHF-2B Milling Machine. It combines the working scope of vertical and horizontal millers. The spindle can be placed at a right angle with the longitudinal line of the table, and is adjustable for any angle, from 0 in the horizontal plane to 45 degrees over the vertical plane. Because of the slanting form of the top of the frame, the spindle nose retains the same long distance from the table in both horizontal and vertical positions.

The spindle is journalled in adjustable SKF roller bearings. The gears of the gear box run in oil; the shafts being journalled in roller bearings. The table size of this unit is 40 by 10¼ inches. Twelve spindle speeds, from 50 to 1,300 r.p.m., are available. Standard machines are provided with No. 4

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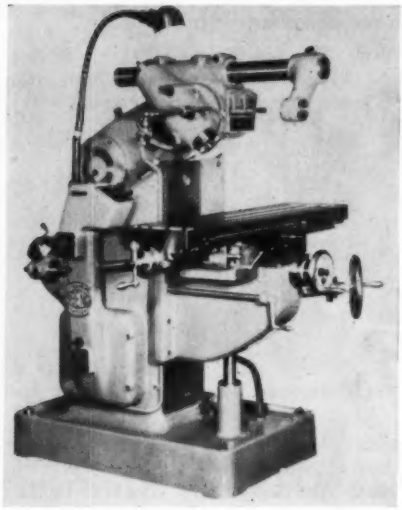

Abene Vertical and Horizontal Miller

N.S.T. tapers. This vertical and horizontal miller is delivered with coolant equipment and lighting.

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TWO STAGE NOTCHER

Vogel Tool and Die Corp., 1823 North 32nd Ave., Melrose Park, Ill., has introduced a two stage notcher, called the Arc-Snug, which provides snug fitting, true contour notching, with clean edges that fit, for induction welding or brazing. It has two sets of punches and dies so that both the first and second cuts of the desired notch are made with a single downstroke of the press.

The left hand punch makes the first cut with the tubing stock held parallel to the base as it is fed into the die. The right hand punch makes the second or final cut with the tubing angled downward when fed into the die. Thus, two separate cuts are made simultaneously with each downstroke.

The Arc-Snug notches clean, from inside out, clear to the outer walls of the tubing. It has been designed so as to give maximum cutting life to the dies and punches and to provide for

REICH—THE ONLY 3-WAY PRECISION TEST INDICATOR

Accurate and repeated reading in either direction. No mirror needed to read both sides or top. Non rust, non magnetic movement. .014" reading.

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RINDIS FILING MACHINE

Removes material 4 to 6 times faster than hand filing

The new RINDIS Bench Model Filing and Trimming Machine can be used for continuous, powerful cutting on all materials which have to be filed, trimmed or deburred. It offers these important advantages:

1. Substantial savings in man hours
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3. Easy operation. No special skill is required
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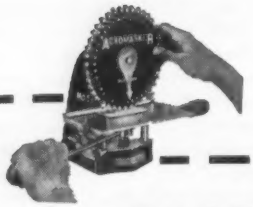
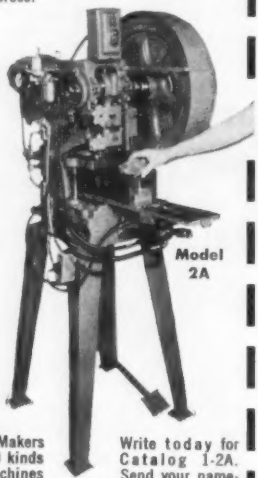


FAST
NAME-PLATE STAMPING

ACROMARKER patented machines are used by the thousands because they're so adaptable to any straight line or true curved line marking job. Several sizes are stocked from 1/16" to 3/8" characters. Styles range from bench and floor stand models to the high production power unit illustrated below that automatically feeds, stamps, serializes, ejects, and collates name plates loaded in a magazine at the front of the press.

Several types of semi- and wholly automatic feeds are available. It's the machine used by the leaders —G.E., Westinghouse, Hoover and many others.



Model 2A

"Inventors and Makers of more than 300 kinds of marking machines —largely standardized. Specify ACROMARK to get the right machine for the job."

Write today for Catalog 1-2A. Send your name-plate for sample marking. Indicate production need for engineer's recommendation.

The ACROMARK Company

9 Morell St., Elizabeth 4, N. J.
"THE ORIGINAL MARKING SPECIALISTS"

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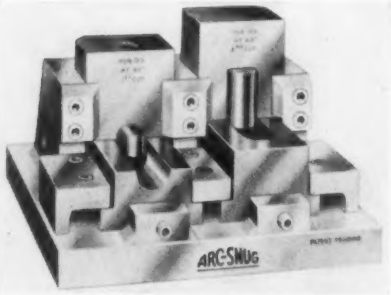

Vogel Arc-Snug Two Stage Notching Unit

simple interchangeability with other dies of various sizes and cutting angles. Arc-Snugs are available for notching 1¼ o.d., 16 gauge tubing and under, at angles ranging from 45 to 90 degrees with the centerline of tubing. This tool requires a 2 inch press stroke and a shut height of 6 inches. It is 12 inches from left to right and 10¾ inches from front to back.

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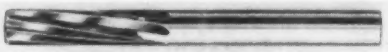
SOLID CARBIDE REAMERS

The Atrax Co., Newington 11, Conn., has announced a series of solid carbide chucking reamers. The series of 21 tools, ranging in diameter from 1/16 to 3/8 inch, are available from stock in fractional sizes. These reamers from 1/16 through ¼ inch are four flute—from 17/64 through 3/8 inch are six flute. Features of the 1564-R Series include right hand spiral flute, straight shank, precision ground lands, radius chamfer and right hand cutting.



Atrax Series 1564-R Solid Carbide Reamer

This series is made to close tolerances. Reamer diameter: plus 0.0002, minus 0.0000 inch; shank diameter: plus 0.0005, minus 0.0005 inch.

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GIANT TURKS HEAD

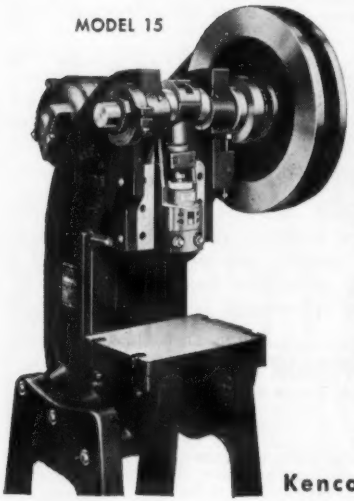
The turks head, product of The Fenn Manufacturing Co., 905 Fenn Rd., Newington, Conn., takes on increasingly important roles in the forming of special shapes from wire and rod with a giant model that has been built for one of the metallurgical research organizations.

The turks head may be compared to an adjustable draw die, but differs in that it is infinitely adjustable within its limiting dimensions. It operates on the rolling mill principle and imparts

★ ★ ★ ★ ★

KENCO 15-TON PUNCH PRESSES

MODEL 15



Rugged . . . designed for high precision, steady production

Here's the strongest press possible to build, regardless of weight. Multiple-rib frame is a rigid Sorbomat casting—75% stronger than any comparable frame. Massive, trouble-free crankshaft is one-piece, alloy steel for maximum strength . . . oversize driving mechanism engineered to prevent breakdown. Entire press is built to hold repairs and maintenance to a new low.

Model 15-R—15-ton deep-throat, Rigid-Rib

Same construction features as Model 15 above, but with 15" throat. Negligible deflection at full-capacity punching.

Kenco presses—14 models—2 to 15 tons

Write for literature

KENCO MANUFACTURING CO.

5211 Telegraph Road, Los Angeles 22, California

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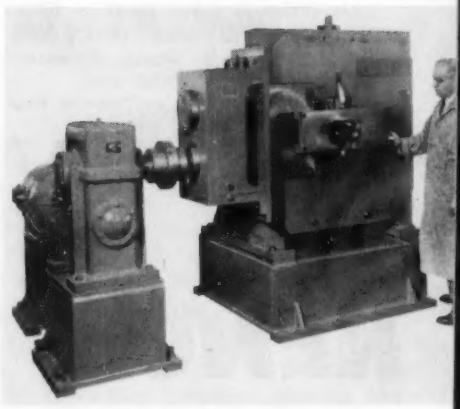
the same qualities to the metal as a rolling mill. The basic difference is in the number and arrangement of rolls.

This large, extremely heavy duty Model 121 Fenn Turks Head can be used for shaping wire and rod sections up to 2 inches in diameter. It is shown tooled with concave type rolls, and the vertical rolls are power driven. Turks heads of this particular type can also be used in combination with rolling mills and draw benches.



Fenn Model 121 Heavy Duty Giant Turks Head

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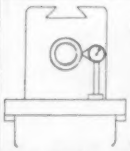

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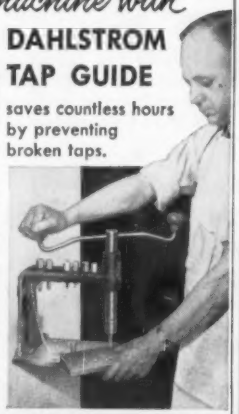
Precision Tapping

by hand or machine with

DAHLSTROM TAP GUIDE

A low-cost Dahlstrom Tap Guide provides the accuracy and close tolerances of large, expensive machines. Tap breakage, is virtually eliminated because material is always held straight and square. Light enough for portability, yet it can be bolted permanently to wall or post.

saves countless hours by preventing broken taps.



Machine Tapping

The spindle top is center-bored to fit the tail stock of a lathe. Simply pull out for lathe use. Same spindle can be used as a tap extension for reaching difficult places. Furnished with 9 adaptor sizes: 8-32; 10-24; ¼", 5/16", ⅜", 7/16", ½", ⅝", and ¾". *Write for bulletin.*

$59.50 F. O. B. FACTORY

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GUIDE WHEEL DESIGNED FOR USE WITH BAND SAW GUIDES

Honed raceway and matched balls of the bearing, plus lifetime lubrication, are the two prime features of a guide wheel for bandsaw guides, recently introduced by Carter Products

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A Low-Priced Dial Type Indicator

Has 2 contacts 1/32" threaded within ⅛". Double Faced. Reads front and back. Two Crystals. Double faced dial indicator complete with plated holder including 1/32" and ⅛" contacts —

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P. O. Box 734, Rochester 3, N. Y.

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Co., Inc., 426 Wm. Alden Smith Building, 30 Iona Ave., Southwest, Grand Rapids 2, Mich. This wheel, manufactured under the name of the Carter "Zefyr" Guide Wheel, is said to effect considerable savings because of its long, maintenance free life. It features lifetime lubrication sealed in with a leakproof metal and teflon seal. The honed raceway and matched ball bearings are said to minimize wear. Accommodating speeds of 10,000 to 12,000 r.p.m., the wheel is being produced in two sizes: No. 20, corresponding to trade size No. 0 for 8,000 to 10,000 f.p.m., and No. 10, corresponding to trade size No. 1 for 10,000 to 12,000 f.p.m., which will handle over 100 pounds of thrust load at 2,500 hours average life. The manufacturer claims that the two sizes of the Zefyr Thrust Wheel will fit any standard bandsaw guide.

For more data circle 97 on Postpaid Card

The Carter Zefyr Bandsaw Guide Wheel

STAMPING PRESS EQUIPPED WITH ELECTRONIC CONTROLS

A Multi-Color Hot Stamping Press has been developed by The Acromark Co., 9 Morrell St., Elizabeth 4, New Jersey.

The press itself is the standard Acromark 2AH Press, but a special front extension has been added to which a

More per hour with MEAD

WORK FEEDERS

Feed work fast to drill, tap, broach, mill. Delivers, holds, ejects stampings, castings, screw machine parts up to 3"—thousands per hour. Combines with MEAD Timers and Drill Press Feeds for easy, cost-saving automation.

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MEAD
SPECIALTIES COMPANY

4114 N. Knox Ave., Dept. AA-18, Chicago 41, Ill.

PATHFINDER IN AIR POWER AUTOMATION

For more data circle 559 on Postpaid Card

large dial, automatic feed and electronic controls have been incorporated. Furthermore, to the head of the press has been added a new arrangement whereby two or three colors can be hot stamped at one time.

This hot stamping machine has several unusual features: it has a variable dwell period to suit the work; it has a variable pressure provision to suit the particular material that is being hot stamped; and it is provided with an automatic control that provides preheat contact and then the proper amount of pressure, for a perfect mark.

Automatic temperature control and independent automation roll leaf advance for each color are added advantages. In event of jam or lack of parts in the duo-feeding, a photoelectric interlock stops either or both feeds, automatically. The operating speed is 130 two color pieces per minute at 100 percent loading. After turning the switch, one lever controls the complete operation. Each operator has a separate control, however, to the main unit control. These operators are only used, however, for positioning. With an automatic positioning unit, which may be added, the entire production of these parts may be automatic.

Designated as the Acromark Model 2AH Multi-Color Hot Stamping Press with dial feeds and electronic

IMMEDIATE SHIPMENT

Shelving Insert No. 5002

Convenient storage of Drills, Tools, Taps. Insert Tapers from 7½" at top to 17" at bottom. Label Holders on Each Shelf - - - - - - - **$44.75**

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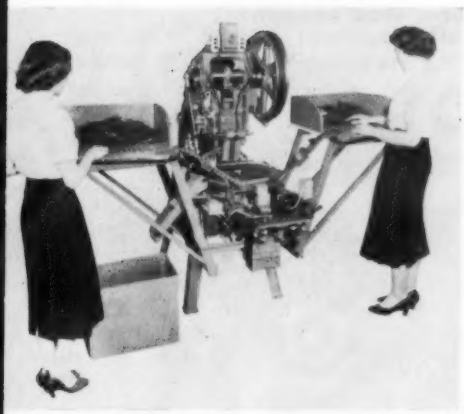

Acromark Multi-Color Stamping Press

control, this machine is readily adaptable for use at its proper station in a line of automation.

The overall size of the press is approximately 10 by 3 by 6 feet. The motor is ½ h.p., a.c., 220/440 volt, three phase, 50-60 cycle with overload and low voltage protection. The air feeder operates at approximately 80 p.s.i. with all controls provided with lubricating unit, muffler and so on.

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★ modern machine shop ★

SLIDE REST FEATURES EASE OF OPERATION

A versatile slide rest has been placed on the market by The Wade Tool Co., 49 River St., Waltham 54, Mass., for which the manufacturer claims certain improvements over the conventional slide rest. One of these advantages, it is said, is that the swivel slide, which is graduated in degrees, may be swung and used for turning operations on the lathe without interference between handles or slides.

The manufacturer has named it the "Super Slide Rest" and says that it

Write for full details

Derbyshire *fine precision equipment*

MICROMILL
2 Table Surfaces: 7⅞" x 2½" — 12" x 2½" — Takes Magnus Collets.

WEBSTER WHITCOMB 12" BED
Center Height—5 CM, Collet Capacity—.1969"

ELECT LATHE — 18" BED
Center Height—2.35" (6 CM)
Chuck Capacity—.004" to .315"

MAGNUS LATHE — 12" BED
Center Height — 5 CM
Collet Capacity — .315"

MODEL No. 750 — 22" BED
Center Height — 7.50 CM, Collet Capacity — .315"

If you have a problem . . . concerning small precision turning or milling, one of these lathes or the milling machine shown should solve it. Write for Catalog.

F. W. DERBYSHIRE, INC.
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WALTHAM MASS.

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OPTICAL TANGENT ANGLE AND RADIUS DRESSER

- SEE THE GRINDING WHEEL AND DIAMOND MAGNIFIED THROUGH THE SPINDLE HOLE
- SET THE RADIUS WITH GAGE BLOCKS
- SET ANGLES AND ANGLE STOPS WITH ONE DEGREE VERNIER MARKINGS OR ON A SINE PLATE
- PROVEN AND ACCEPTED BY BOTH LARGE AND SMALL COMPANIES

DRESSER PRICE $285.00

EDGE FINDERS & VISE STOPS

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Diamond Wheel Dressers

Guaranteed to be full, individual stones, mounted in 7/16 x 5" cold rolled shanks

Carat	Price
1/4	$ 2.25
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3/4	6.00
1	8.25
1 1/2	12.00
2	16.00

★ These diamonds can be set in any shank to your specification for $1.00 each extra.

★ Prompt resetting service

Allstate Diamond Products, Inc.

Manufacturers of a complete line of diamond tools and wheels

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★ Dealers' inquiries invited

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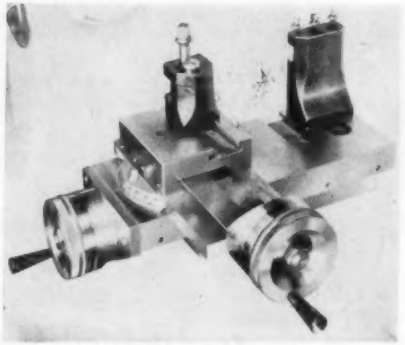
new shop equipment . . .



Wade Tool Versatile Super Slide Rest

has the features of a conventional slide rest with a center driven tool post slide and an open side tool post.

This slide rest has the following dimensions and features: top slide travel is 4½ inches; tool bit size is ⅜ by ⅜ inch; hardened and ground screws of ½ inch diameter are supported on ball bearings for effortless accuracy; the satin-chrome finish dials, just under 3 inches in diameter, are both direct reading in thousandths of an inch and are resettable to zero. The rear tool station and tool post are provided as standard equipment. This rear station makes turning and cutting-off, or any other two operations, possible without disturbing the tools.

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HOLE PUNCHING UNIT

Wales-Strippit Co., a unit of Houdaille Industries, Inc., 207 South Buell Rd., Akron, N. Y., recently announced its Type CJ Hole Punching Unit, which has been adapted for both

punching and riveting half-rounds by the use of special interchangeable punches and dies. These units are ordinarily used in punching flanges, webs and legs of structurals and extrusions, as well as flats up to a capacity of 1.250 inch diameter holes in 0.250 inch mild steel.

The accompanying illustration shows a Strippit CJ Unit riveting spacers to the half-round part. The regular punch and die button have been replaced with a riveting punch and die button. The press, in this case, becomes a riveting machine. Nothing is attached to the press ram, which is adjusted to depress the punch to correct 8⅜ inch shut height for proper flattening of the rivets. Interchangeability of tools in universal punch and die holders make these punching units adaptable to a wide variety of special operations in press setups.

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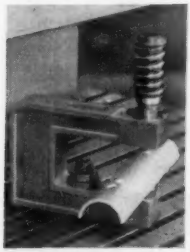

Wales-Strippit Type CJ Punching Unit

MANUFACTURING LATHE WITH CUSTOM FEATURES

The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio, recently announced a manufacturing lathe, available with a wide variety of basic features and attachments, which can be specified by the customer. Known as the LeBlond Rapid Production Lathe, it is available in 17 or 20 inch swing sizes and is reportedly designed from the ground up specifically for the manufacturing type of assignments.

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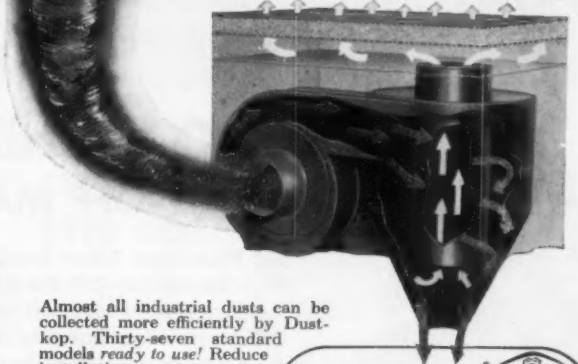

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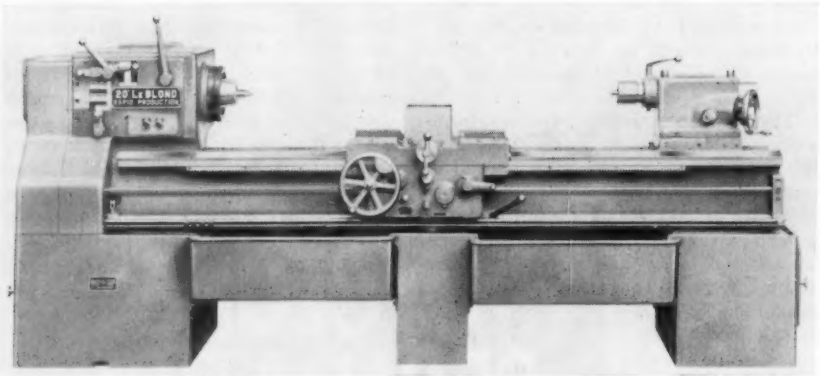

LeBlond Rapid Production Lathe is available in either 17 or 20 inch swing sizes

The lathes are fundamentally simple so that the customer can add exactly the features desired. Beginning with the choice of swing sizes, many

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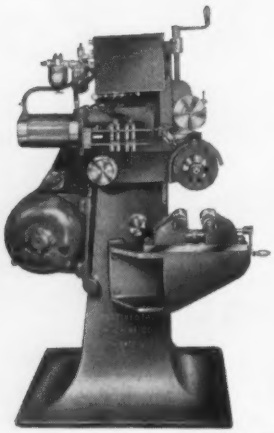

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basic options are obtainable. First, choice of speed ranges: on the 17 inch, 70 to 700 r.p.m. or 105 to 1,050 r.p.m.; on the 20 inch, 57 to 600 or 85 to 900 revolutions per minute.

There is a choice of any or all of these specific features: Hydra-Trace hydraulic tracing, automatic facing, air operated chucks, quick acting tailstock, connected rests, taper attachments, turret tool post, cross and length stops and numerous others.

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★ mms ★

C CLAMP SWIVEL IS LOSS PROOF

Wilton Tool Manufacturing Co., Inc., Schiller Park, Ill., claims that a great deal of lost time, money and temper will be saved in the future by Perma - Pad, which is said to be an entirely new type of C clamp swivel, and it is claimed to be 100 percent loss proof.

Conventional swivel pads will come loose or break when they are forced beyond their normal circumference of travel. The collars of these pads are thin and lose much of their strength when they are crimped onto the C clamp spindle. A C clamp without a pad is useless, and loss of swivels has always been an annoying and costly problem. The Perma-Pad, however, is made of stock that is three times as heavy as a conventional pad in the vital collar area, and no crimping is used in assembly. Inside the collar is a groove machined to accept a hard-

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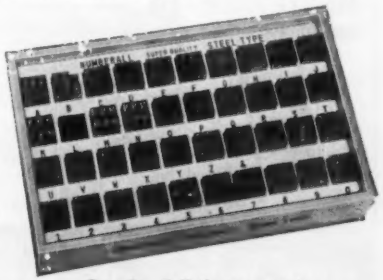

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For Drilling, Milling, Tapping, Sawing, Tool Grinding and Lubricating. • Corrosion proof, dual outlets standard, fine spray for maximum cooling, 1 and 2½ gal. translucent containers show liquid level, use with water, coolants or oil. • *Write for new folder.*

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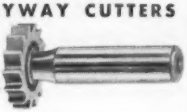

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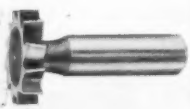
Smoother Cutting. Longer Life.



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new shop equipment . . .

(1) Conventional swivel pad (2, 3 and 4) Wilton Perma-Pad which is held in place by a retainer spring (5) cross section drawing shows construction of Perma-Pad Swivel

ened steel spring. Clamps are assembled by forcing the spindle ball past the spring. The spring then expands behind the ball, forming a union that will withstand as much force as the spindle itself. Perma-Pads, when attached, have a free swing through a 60 degree arc. Perma-Pads are available only on Wilton Rapid-Titan and Conventional Action Industrial C Clamps, and are one of two improvements made in these clamps in recent months. The other one is a 23 percent increase in spindle strength which is obtained by using an improved, shallower, double lead Acme thread.

For more data circle 102 on Postpaid Card

★ modern machine shop ★

10 INCH SWING CENTER LATHE

The "Little John" 10 Inch Swing Center Lathe, announced by The

Wickman Products Corp., 10325 Capital Ave., Detroit, Mich., swings 10¼ inches, admitting 24 inches between centers with a spindle bore of 1-1/32 inch.

The headstock is cast integral with the bed. It houses the spindle, back gears, layshaft and switch, with the controls for the back gear and tumbler bracket conveniently situated for easy engagement. The bed with the headstock is a one piece casting of unusual strength and rigidity. The guides for the saddle are hardened and accurately ground. These guides are of such ample section that they are said to be practically unwearable and maintain alignments indefinitely.

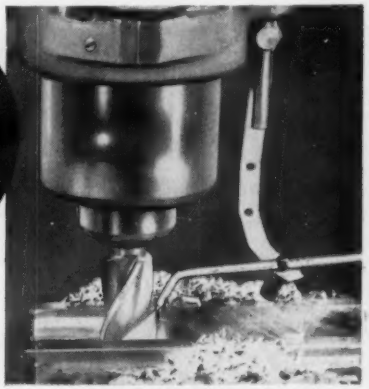
The spindle nose has two accurate locating positions and the threaded portion is used only for tightening purposes, thus insuring true running for catchplates, faceplates, chucks and so on. Timken precision roller bearings are fitted with adjustment for preload.

The infinitely variable speed drive, by a 1 h.p. motor, transmits ample power, and any required spindle speed in conjunction with the back gearing, ranging from 38 to 1,750 r.p.m., is obtained instantly by a simple movement of the control lever.

The back gears are mounted inside the head and are adjusted by means of a lever, which protrudes through a slot on the front and is secured by a knurled nut. This operating lever is hollow to allow for lubrication. The

Mistic Mist GENERATORS

COOL THE TOOL...not the chips!



REDUCES OPERATING COSTS . . . INCREASES PRODUCTION EFFICIENCY

In machine tool operations, heat is generated by the separation of the chip from the work by the tool . . . chips transfer heat to the tool which becomes increasingly hot until its cutting edge loses its temper and provides a poor finish. Flood cooling lacks efficiency because the coolant is applied mainly to the chip; therefore, the cutting edge of the tool receives very little, if any, coolant.

The application of Mist cools the cutting edge of the tool, thereby increasing tool life up to 500% and assuring faster and better finishes. MISTIC MIST GENERATORS provide the most economical, efficient and practical mist generating system available.

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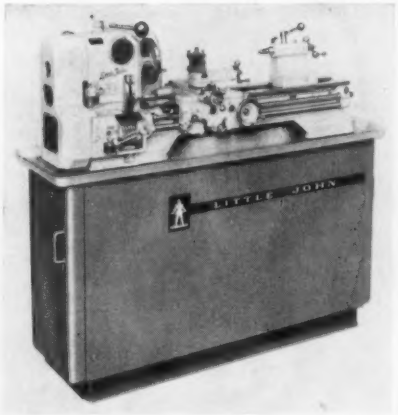
machine is equipped with load and feed screw.

The saddle has a swivelling cross slide, effectively locked in any desired position. The cross feed screw assembly can be removed without dismantling the apron. The apron has double bearings. Large diameter dials are fitted and are spring loaded for instant positioning. An adequate threading dial is fitted as standard.

The quick change gear box enables a range of threads from 4 to 60 T.P.I. to be cut without the use of a set of changewheels. For metric threads, four special gears are provided as standard equipment.

The tailstock is of heavy construction and has quick action clamping, requiring no spanners. It can be offset for turning small tapers between centers. The ram has a No. 2 Morse Taper bore.



"Little John" 10 Inch Swing Center Lathe admits 24 inches between centers

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Delicacy or fragileness no longer need be associated with accuracy!

The new PROTECTOR Gage Tip* provides complete protection against BLOWS FROM ALL DIRECTIONS—even head-on—and the Cleveland INDI-AC Electronic Height Gage still remains accurate to MILLIONTHS of an inch.

An accidental blow, due to handling, or mistake in set-up, merely deflects the Gage Tip instead of transmitting the blow and damaging the gaging elements.

Only available on new Cleveland INDI-AC Electronic Height Gages—or as a replacement for standard tips on INDI-AC'S now in service.

*Patent Applied For

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PRODUCTION TABLE ADDED TO DRILL PRESS

The Electro-Mechano Co., 265 East Erie St., Milwaukee 2, Wis., recently announced that it has added a production type table with a lifting mechanism and multiple head floor type bases to its line of precision toolroom drill presses.

The Electro-Mechano 16 Inch Drill Press, shown in the accompanying illustration, offers an infinitely variable speed range from a low 150 r.p.m. and any speed up to 4,000 r.p.m., without the use of special attachments. Instant engagement of the direct or geared drive, plus variable speed drive, results in a wide range of available speeds.

Electro-Mechano 16 Inch Drill Press

Precision helical back gears supply the low speeds, down to 150 revolutions per minute, for spotfacing, tapping, reaming and drilling with increased power and a minimum of belt slippage.

The direct spindle drive supplies the high speeds, up to 4,000 revolutions per minute.

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NOW! GET THIS NEW

problem-solving
Set Screw Catalog 21
FREE

Brings you up to date on latest developments in all types of Set Screws, including Hopper-Fed for Automation.

You'll find this new, comprehensive Setko Catalog an invaluable reference manual in solving tough, puzzling Set Screw problems. Lists all standard set screws... plus many special types designed for unusual conditions of vibration; close precision setting; resistance to tampering, chemicals or heat; extra holding power; etc. Describes many specific ways in which Setko Set Screws cut costs and improve product quality.

Partial Contents of New Setko Catalog 21:

* Hopper-Fed Headless Set Screws, with New Automated Feed System
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* *Indicates Setko Set Screw "Firsts"!*

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Use letterhead—or write name and address in margin of this page, tear out ad and mail.

Set Screw & Mfg. Co.
152 Main St., Bartlett, Ill. (Chicago Suburb)

We Specialize in Solving Puzzling Set Screw Problems

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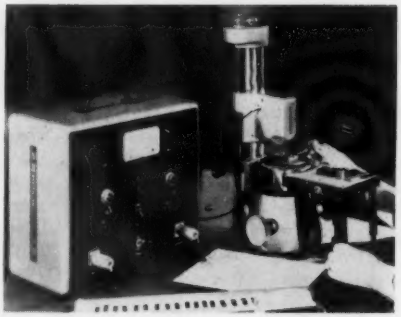
new shop equipment . . .

INSTRUMENT MEASURES MILLIONTHS OF INCH

One millionth of an inch accuracy is said to be obtained with an electronic gage block comparator produced by the Sheffield Corp., Dept. 12, Dayton 1, Ohio. This instrument has been named the Eli Whitney Dualjet Gage Block Comparator.

This ultra precise instrument is used to check the size of gage blocks which control dimensions for the manufacture of automobiles, jet planes, missiles, refrigerators and most mass-produced articles. The unusual accuracy of the Dualjet Comparator is based on the use of an opposed pair of transducer type pickup units.

Measurement is amplified either 100,000 or 10,000 times by an Accutron electronic amplifier. High magnification has a 0.000004 inch range and scale divisions of 0.000001 inch. A range switch permits instant change to low magnification (10,000 to 1 with a 0.0004 inch range) without recalibration. The Accutron amplifier operates on 110 volt, 50/60 cycle, alternating current. Compensation is pro-

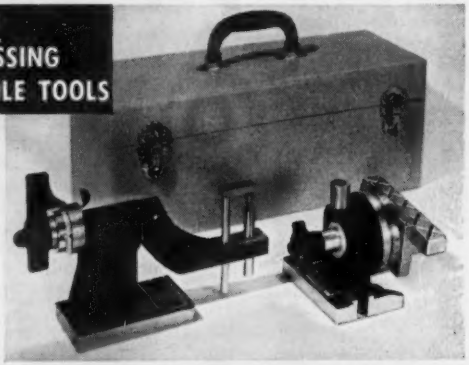


Eli Whitney Dualjet Gage Block Comparator

Now ANGLE TANGENT TO RADIUS WHEEL DRESSING WITH NEW VERSATILE TOOLS

MIGHTY GOOD AT ANY PRICE BUT TOPS AT ONLY $149.50
(Both tools including diamonds)

The G-5 RADIUS DRESSER is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on a 7 inch or 10 inch wheel, and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation. The G-2 ANGLE DRESSER AND TOOL HOLDER is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up small jobs to be milled, drilled, tapped, etc., on any desired angle.



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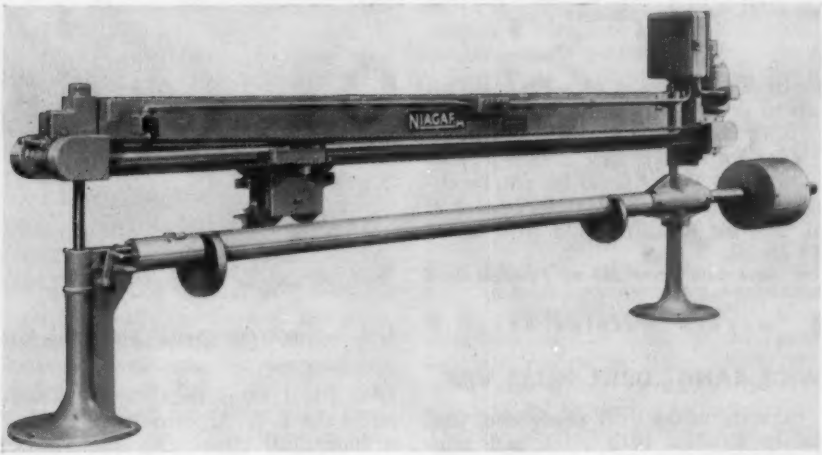

Niagara Giant Power Groover features pushbutton controls to simplify operation

vided for line voltage changes ranging from 95 to 125 volts.

A precision ground, 40 pitch leadscrew on a steel column, rigidly mounted on the sturdy cast base, provides vertical coarse adjustment of the top gaging head. Fine adjustment is made with a cam and lever mechanism in the base with knobs that are completely isolated from the gage head or anvil. The gage has interchangeable diamond points and a gage point lifting device to avoid scratching the surfaces of the work. Gaging pressure is 8 ounces; vertical capacity is 4 inches. A ratchet type device raises or lowers the gage head in increments of 0.0005 inch.

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PUSHBUTTON CONTROLS SIMPLIFY OPERATION OF POWER GROOVER

Featuring pushbutton controls conveniently located at the center of the machine, Giant Power Groovers have now been modernized and equipped for the utmost in operating ease and speed, according to Niagara Machine and Tool Works, Buffalo 11, N. Y.

Power is supplied by a direct-connected reversible gearhead motor with built in brake to stop the carriage quickly for rapid return stroke. A built in zero speed switch protects the motor and gears from overload by preventing reversal when the carriage is still in motion. Driven by a pair of endless chains, the carriage is returned to the starting position auto-

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Done to your specifications
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matically by means of a limit switch which reverses the drive.

With eight models available for single or Pittsburgh lock seaming, Niagara Giant Power Groovers can be obtained with working lengths from 4 to 10 feet for handling mild steel up to 16 gauge.

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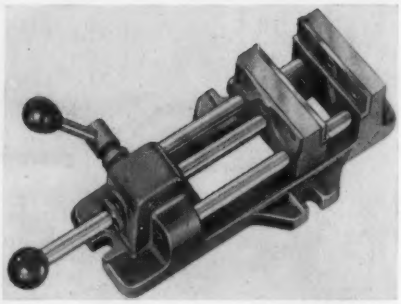

L-W Adjusto-Quick Control Drill Press Vise

WIDE RANGE DRILL PRESS VISE

A wide range drill press vise, that safely handles both rigid and non-rigid work without distortion has been developed by L-W Chuck Co., 28 South St. Clair St., Toledo 4, Ohio. A simple turn of the front adjusting screw bushing varies the jaw pressure from 1 to 1,500 pounds. Being marketed as the L-W Adjusto-Quick Control 4 Inch Drill Press Vise and Fixture Holder, this precision built device was especially designed to cut tooling costs and increase production. The heavy, 4 inch wide removable jaw inserts allow simple, quick adaptability for low cost

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-make square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:
3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

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jigs and fixtures. The maximum opening is 5½ inches.

Each hand pressure on a hardened and micro-ground bar locks and holds the work fast.

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METALLIZING MACHINE HAS ELECTRONICALLY CONTROLLED ELECTRIC DRIVE

In line with the current trend towards automation in high speed production operations, an electronically controlled metallizing machine has been developed by Metallizing Engineering Co., Inc., 1177 Prospect Ave., Westbury, L. I., New York.

Called the Metco Type K Metallizing Machine, this is a rugged, heavy duty, production machine tool that will spray any metal available in wire form. It is equally well suited for use as an individual unit or as a built in part of a complete automation setup for large scale production.

The Type K Unit is driven by a high capacity electric motor, monitored by an electronic control system, which permits adjustment of wire speeds throughout the entire usable range without changing the grip on the wire or the position of the gas head. Once adjusted, wire speed is held constant, regardless of fluctuations in load and operating conditions by the simple, reliable, industrial type electronic control unit. Motor, gear box and control unit are totally enclosed and sealed to prevent damage which might be caused by metal dust. The gas head has a removable, high efficiency siphon plug. A built in, quick reset footage counter instantly shows the exact amount of metal sprayed.

This machine will handle all sizes of metallizing wire up to 3/16 inch diameter at steady wire speeds from

- Super high speed steel greatly increases wear resistance.
- Special non-metallic surface treatment further extends life between sharpenings.
- Precision taper ground for maximum rigidity—faster, cleaner cuts.

The finest circular form tools and cut-off blades are made by Somma. Nation wide distribution.

Prices and name of local distributor on request.

Somma TOOL CO., INC. 120 BROWN STREET, WATERBURY, CONN.

West Coast Warehouse: 576 N. Prairie, Hawthorne, Cal.

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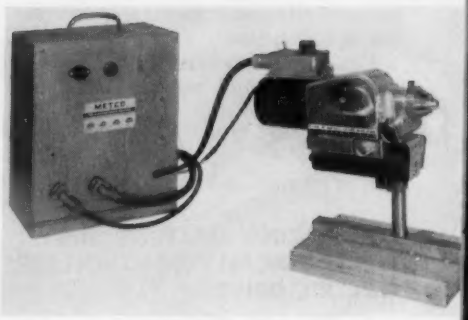
9 to 40 feet per minute. This wide range and the exact control obtainable at any given point within it, insures the user that he will obtain the optimum setting for spraying requirements which can be easily synchronized with an automatic parts handling setup that may include automatic indexing stations.

Rugged, heavy duty components have been used throughout in the construction of the machine. All rotating parts run on ball bearings and the gears are sealed in heavy duty gear oil, which is pumped to all bearings for positive lubrication in all operating positions. Controls and motor provide high speed acceleration and dynamic braking for responsive on-off control of wire feed. The flexible speed control unit can be mounted on the machine or at a remote position. The power supply unit not only maintains wire speed constantly, regardless of changes in load, but also automatically corrects for all the usual variations in line voltage.



Metco Type K Metallizing Machine is shown here equipped with electronic control

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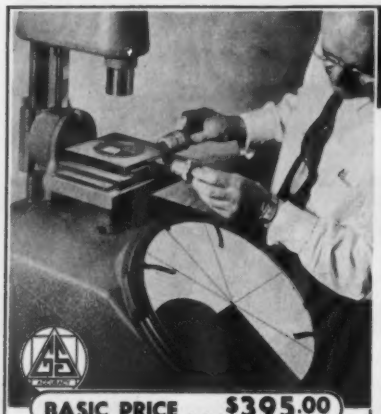

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- 4" Dia. Stage Opening
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- Column Slide adjustable for wear by means of gibs. Will hold square indefinitely.
- Custom made Precision Coated Lenses and double condensers for different objectives 10 to 100X magnification.
- Surface Illuminator can be added anytime.
- An entirely new practical designed tool for Inspection Department and Production Shop.

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OVERLAY and REPLACEMENT STANDARD CHARTS are carried in stock.

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WRITE FOR ILLUSTRATED FOLDER — CODE GIUJY

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For more data circle 577 on Postpaid Card

ROCKER TYPE AUTOMATIC LOADER SPEEDS HONING OPERATIONS

A rocker type Red Ring Automatic Loader, for handling long shaft, unsymmetrical gears on both gear tooth honing machines and rotary gear shaving machines, has been announced by National Broach and Machine Co., 5600 St. Jean, Detroit 13, Michigan.

This loader has a built in gaging device, magazine feed, air powered rocker type loading mechanism and a discharge chute that feeds finish honed parts to the unloading position in front of the operator.

A specially designed assembly of lever type grip fingers in both input magazine and discharge chute keeps the gears from touching each other and avoids the cocking of parts that can result from the effect of the greater weight of one end of an unsymmetrical, long shaft gear.

The rocker type unloader mechanism is a simplified design that requires minimum maintenance and is practically unaffected by chip conditons. Operation of the loader is entirely automatic when used in conjunction with standard gear tooth honing machines or rotary gear shaving machines equipped with suitable controls and air powered head and tailstocks. The operator merely keeps the input magazine full of gears and removes finished gears from the exit chute. The loader is also adapted to applications on fully automated lines.

The operator fills the input magazine with long shaft gears and presses the cycle start button. The rocker mechanism picks up a gear at the end of the magazine and rolls it into mesh with the honing tool. In the event that meshing is made incorrectly, the rocker automatically retracts and remeshes the gear with the honing tool. With the gear properly meshed, the air op-

the **ARC-TWIN** *Cuts Two Perfect Notches*

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SAVING both time and cost, it gives you perfect T-joints — instantly ready for welding or brazing without deformation or finishing! Twin-acting punch shears clean, from inside out, leaving two matching notches (in perfect 180° alignment) with every downstroke of the punch press. Quickly interchangeable dies and punches accommodate pipe and tubing from ½" to 2⅜" O.D.; special units, up to 3" O.D.

Special Arc-Twins for double notching stainless steel or monel metal and units built to your specifications can also be furnished.

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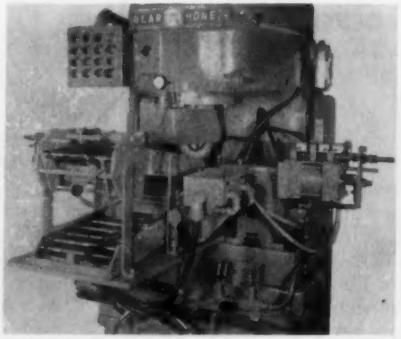
erated head and tailstocks automatically advance to support the work gear, and the honing cycle is started.

While the gear is being honed, the rocker retracts to the loading position where another gear drops into position. When the gear is honed, it is automatically unloaded by the rocker mechanism, and the next gear is rolled into mesh with the honing tool.

Oversized gears are rejected automatically before entering the input magazine. Oversized work gears will not pass between the gaging gears in this magazine. In this design, the gears are loaded in a pivoted carrier, which has a hand lever that is raised to pass the long shaft gears through the gaging master in square relationship.

The lever type fingers in the input magazine and discharge chute, pivot as each gear passes over them. Weight of a gear causes individual levers at each shaft end to rock down, thus raising the ends of the levers, which act as stops for the following gear.



Red Ring Rocker Type Automatic Loader for long shaft unsymmetrical gears mounted on a Red Ring Gear Tooth Honing Machine

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STANDARD END FACE SEALS

A line of end face seals in standard sizes is now being offered by Chicago Rawhide Manufacturing Co., 1233 Elston Ave., Chicago 22, Illinois.

Pre-engineered to meet a wide range of sealing requirements, the C/R Standard End Face Seals are available in two complete series; long and short. Specifications include ¾ to 4 inch shaft sizes; pressures to 500 p.s.i.; temperatures to 500 degrees F.; and peripheral speed up to 15,000 feet per minute.

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★ mms ★

TOOLMAKER MICROSCOPE

Opto-Metric Tools, Inc., 137 MM-10 Varick St., New York 13, N. Y., has announced the Leitz-Wetzler Simplex Toolmaker Microscope. The manufacturer claims the following as features of this instrument: fully erect image in inclined ocular; interchangeable thread template, radii and protractor oculars; interchangeable telecentric objectives for different magnifications; tilt of microscope tube to plus or minus 5 degree helix angle; chromatic understage illumination; bi-chromatic surface illumination; 2 by 2 inch measuring range in 0.0001 inch; 7 by 6 inch table surface with 4 inch stage glass; 20 or 360 degree rotary stage motion; and horizontal center support.

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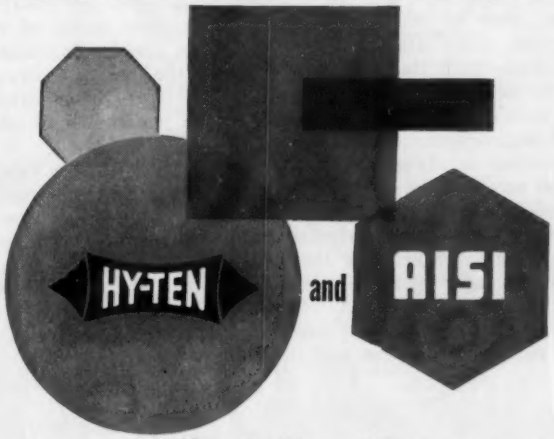
Leitz-Wetzler Simplex Toolmaker Microscope



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OVERHEAD FORK LIFT

A heavier, more versatile overhead fork lift has been developed by the Cleveland Tramrail Division, The Cleveland Crane and Engineering Co., 6449 East 281st St., Wickliffe, Ohio, that embodies many new features and refinements.

When used on a Cleveland Tramrail Crane, this unit can be traveled to front, rear or either side of a building; up, down and turned through a full circle both clockwise and counterclockwise.

There is no problem with floor wear and maintenance, because the entire operation is above the floor. Nor is there any battery charging expense or gasoline engine repairs with which to contend. Dependable electric motors, requiring nothing more then periodic lubrication, power Cleveland Tramrail Fork Lifts.

Tramrail Fork Lifts are available for various capacities and lifts. They can be supplied with all motions, motorized or manually operated, or any combination thereof. If not required, the rotating motion can be omitted. Units can be telescoping type, as illustrated, or non-telescoping. The former type permits unobstructed use of aisleways when in the raised position. The telescoping type also makes possible travel over railroad cars and trucks, thereby enabling the handling of materials directly to storage without transferring to other conveyances. Forks are easily adjusted to accommodate width of materials handled and can be furnished to serve both sides of an aisleway for non-rotating type fork lifts. Forks can also be made of various sizes and shapes to suit specific needs.

The fork lift illustrated is powered with three motors. One propels the unit on a crane bridge, or a two track runway, driving wheels on both sides by means of a jack shaft. The fork hoist motion is operated by a motor driving heavy chains connecting with the fork and a counterweight. Rotation is accomplished by means of a motor driving a large gear at the top of the unit.

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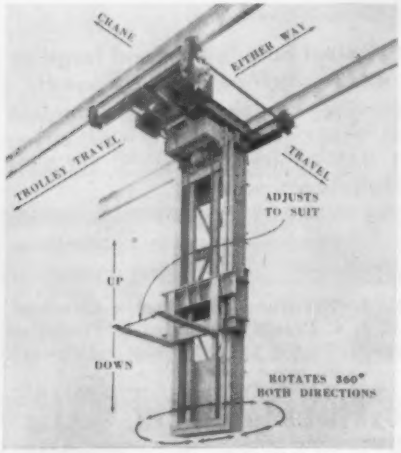

Cleveland Tramrail Overhead Fork Lift

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AUTOMATIC WHEEL DRESSING TO TENTHS

Automatic, hydraulic operation, with dressing accuracies within a tenth, are offered by the Model 89 Hydraulic Contour Wheel Dresser, recently announced by Hoglund Engineering and Manufacturing Co., Inc., 347 Snyder Ave., Berkeley Heights, New Jersey.

Designed for use with cylindrical grinders, the unit will dress any angle on the wheel perpendicular, as well as horizontal. If necessary, it can undercut grinding wheels and can dress

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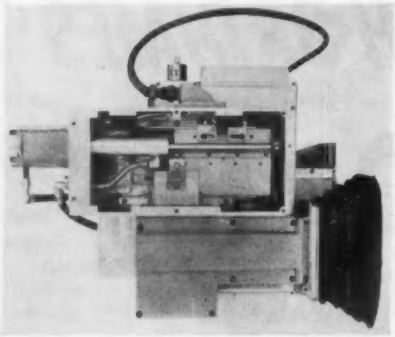

Cover removed, revealing templates and mechanism of Hoglund Contour Wheel Dresser

at uniform peripheral speed. Automatic down-feed and optional automatic crossfeed compensate for wheel wear in two planes.

The Model 89 is available with precision computed templates for profile widths up to 6 inches and profile depths up to 3½ inches. It employs an inclined plane cam reduction mechanism with hardened, ground and lapped bearing raceways.

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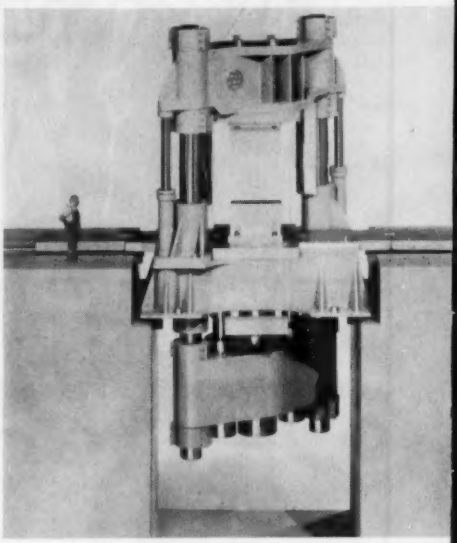
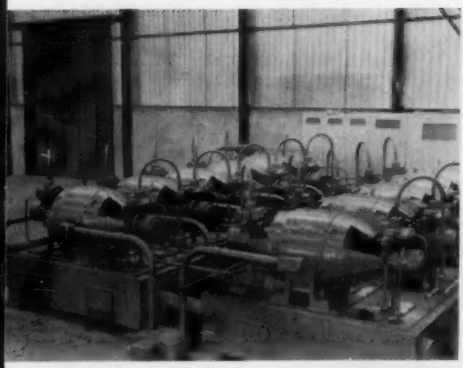
HIGH PRESSURE HYDRAULIC POWER 2,000 TON SELF-CONTAINED FORGING PRESS

A Goliath of the forging machine industry has been built by the Lake Erie Machinery Corp., Buffalo, New York, for Allegheny Ludlum Steel Company, for its Dunkirk, New York plant. This 2,000 ton high speed forging press is claimed to be one of the largest and most efficient self-contained hydraulic forging presses. Capable of 30 forging strokes per minute at full tonnage or 80 planishing strokes per minute at approximately 1,000 tons, this single action forging press is of a basic two column pull down type design.

The press is driven by 20 Denison Pumps, each having a capacity of 34.96 g.p.m. of turbine oil at 4,420 p.s.i. powering ten double end, 150 h.p., 1,200 r.p.m. motors. Hydraulic equipment and power units are located some distance away from the press. A pressurized prefill tank is mounted near the press and is connected directly to the forging press cylinders by a large diameter pipe. The movable die slide, located on the bed of this press, is powered by a hydraulically operated gear and rack arrangement receiving its power source from the same master pressure tank as the press cylinders. The die slide, which consists of six 7 foot long coupled units, travels through 24 feet and constitutes the lower bolster of the press.



Lake Erie Hydraulically Controlled Goliath



Power unit is composed of 20 Denison Pumps

Denison Hydraulic Pumps were chosen for this installation because the system is of a high pressure nature.

The actual physical design of the press, which is said to rank it among the first of giant forging machines, is a maximum working stroke of 72 inches with a width of 120 inches maximum daylight between the top and bottom bolsters. Clearance between the shields, which protect the columns, is 48 inches front to back and 90 inches left to right.

The center cylinder and the two side cylinders, governing the pull down action, are inserted in the lower crosshead of the press. The two hydraulic cylinders inserted in the bed platen interact with the pistons which are coupled to the upper crosshead to provide for the reverse action.

The head of the press stands 19½ feet above the floor and extends 15 feet below the floor level. A single

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stainless steel console adjacent to the press is the only unit used to control the complete function of this forging unit.

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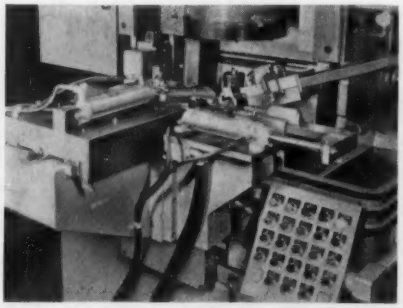
AUTOMATIC LOADER SWINGS CLEAR FOR TOOL CHANGE

An automated parts loader that feeds parts at any rate up to 100 percent machine efficiency, yet swings clear of the machine for easy tool change, has been developed and built by Michigan Tool Co., 7171 East McNichols Rd., Detroit 12, Mich. Designed initially for the company's model 1853 Shear-Speed Gear Shaper, the loader can be quickly and easily adapted for all Shear-Speed Machines in the 1800 Series.

The loader feeds parts two at a time from a two position (90 degree spacing) index dial. Parts enter the feeder from an entrance chute, one part dropping into a recess while mechanical fingers momentarily retain the second part. When released, the second part stacks on top of the first. From this point both parts are transferred to the index dial, indexed, machined and ejected as a uit.

Automatic sequence of operation is: (1) The index slide advances into position under the Shear-Speed's cutting head. (2) The part locator, a hydraulically actuated arbor, is retracted below the level of the index plate. At the same time the index dial advances 90 degrees, bringing the two parts into loading position. (3) The part locator is then raised, entering the parts and positioning them for shaping. The locator has a predetermined length of time to enter the part, if entry is not completed the part is rejected by a 90 degree index to the unload position. (4) Index slide retracts. This same action moves a mechanical finger that pushes double stacked parts from the entrance chute into the parts feeder. (5) Cutting cycle. (6) The index dial returns 90 degrees and the parts feeder slide advances to place another double part in the index dial. (7) Index slide advances index to accept part for ejection and so on. In one production operation, cutting a 36 tooth involute spline on a 0.850 inch face width of a clutch hub, a Michigan 1853 Shear-Speed equipped with this loader produces 180 parts an hour. Automatic cutting cycle for both parts is 32 seconds. Loading time for both parts, at 100 percent efficiency, is only eight seconds.



Michigan Automatic Loader for gear shapers

The possibility of interference of automating devices with tool changes and service requirements is avoided with this Michigan Loader. It has been designed with a swing out type of arrangement.

The entire mechanism, feeder, index table and index slide, is pivot mounted so that it can be swung completely clear of the machine. Pin locked stops assure positive alignment.

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VEE BLOCK ANGLE PLATE AVAILABLE IN TWO MODELS

Lassy Tool Co., Plainville, Conn., has announced the availability of its Improved Master Vee Block Angle Plate.

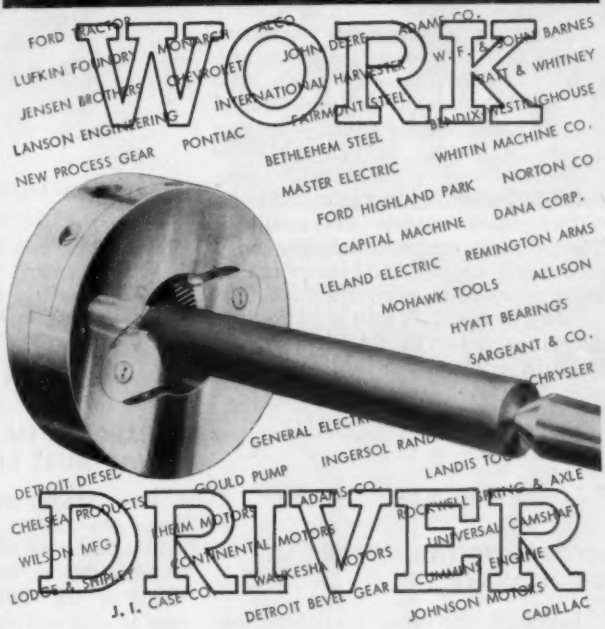
Manufactured of machine steel, uniformly carburized and hardened to a depth of 0.070 thousandths per side with a surface hardness of 64 to 66 Rockwell, these angle plates provide a thick hard outside case to resist wear and are said to be impervious to nicking and raising bumps, while the soft inert core remains stable, maintaining dependable accuracy over a long period of time. Lassy Angle Plates are thoroughly seasoned in between careful grinding operations, maintaining an equal thickness of case on all surfaces.

Every surface of the tool is finished, thereby giving unusual flexibility and usefulness. A side gage, which may be attached to either side, automatically provides for positioning the work precisely and positively without the aid of a surface plate or square, thereby reducing wear on both the surface grinder chuck and angle plate, as there is no need to remove the angle plate from the chuck to the surface plate for setups. This is claimed to automatically reduce the possibility of error due to faulty surface plate, square or jogging of the work while

Lassy Angle Plate

SENECA FALLS AUTOMATIC

WORK DRIVER



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transferring from the surface plate back to the chuck.

Another feature is the adjustable parallel, which attaches to the side of the angle plate and is infinitely adjustable, providing a work shelf of desired height, eliminating much lost time looking for blocks or parallels of many different sizes. A stepped clamp with elongated slot provides for holding even the very smallest pieces with ease and accuracy.

A vee, 1 inch long, holds work from ⅛ inch to 2¼ inches in diameter, providing a large diameter work head clearance. A tee slot, bolt and knurled nut are provided for firmly attaching a sine bar to the face of the angle plate. Also, two ½ inch holes are provided for attaching to a machine table.

Two stock models are available. The No. 8 has a ground finish and is accurate within 0.0002 accumulated error on all surfaces over a 4 inch distance. The No. 8-L with a lapped finish is accurate to 0.0001. Matched pairs in either model are also available. The tool comes complete in a case with all accessories.

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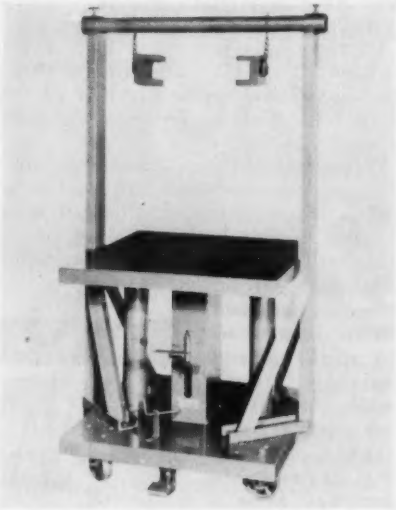
HYDRAULIC TABLE TYPE DIE HANDLER

Lexco Engineering and Manufacturing Corp., P. O. Box 161, Colmar, Pa., has introduced its Hydraulic Table Type Die Handler.

This die handler has a capacity of 2,000 pounds, a 30 by 30 inch table size and a 14 inch clearance to the bottom of the bar with the table top in position. The table operates from 30 inches low to 48 inches high. It has



Lexco Hydraulic Table Type Die Handler

five casters, two swivel and two rigid, and a floor lock. The clamps are movable on the bar for various size dies.

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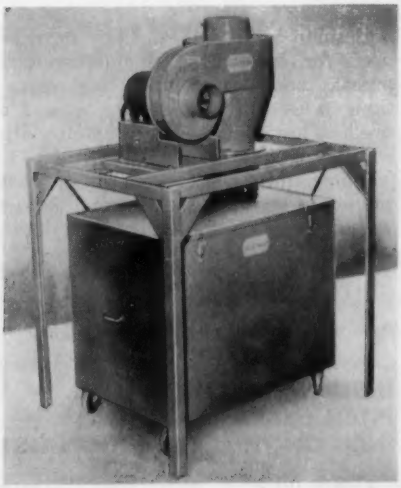
COLLECTOR HAS ROLL AWAY DUST BIN

The Model 5NB20 Dustkop has been especially designed by The Aget Manufacturing Co., 1398 Church St., Adrian, Mich., for use in shop operations of the chip producing variety, but is also suited to any other operation where dust volume is large, the need for air volume is comparatively low and floor space is at a premium. The roll away dust bin has a 9 cubic foot capacity and seldom requires emptying in the course of a normal day's work load. It has a 1/3 horsepower motor and a cast aluminum fan, capable of handling sizeable metal frag-



Aget Model 5NB20 Dustkop Collector

ments and wood chips without plugging. The model shown in the accompanying illustration is outside vented. It is also available as a recirculating collector using a cloth filter bag (Model 5CB20) or the conventional fiberglas filter (Model 5B 20) base; 30 by 35 inches; height 51 inches.

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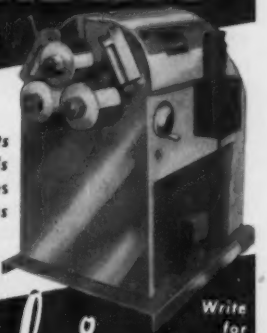
MIST COOLANT SYSTEMS

The Graymills Corp., 3769 North Lincoln Ave., Chicago 13, Ill., has announced the addition of a mist coolant system to its line.

Graymills Mist Coolant Systems are of rugged construction with corrosion proof, heavy duty moulded polyethylene containers. Dual outlets with precisely machined nozzles give a fine narrow cone spray for maximum cooling and air economy.

Graymills Mist Coolant Systems are available in two standard sizes—1 and

Economical! Compact! Durable!
CIRCULAR BENDING Machine



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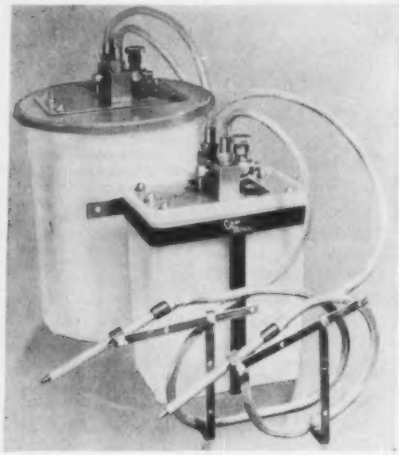
2½ gallon—each with dual outlets as standard equipment. A high quality needle valve controls the flow of air into the manifold and through the nozzles. A selector control on the manifold permits the use of one or both outlets and also regulates the flow of coolant to the nozzles. The intake tube has a 2⅝ inch diameter fine mesh strainer which snaps off for easy cleaning. The large area practically eliminates the possibility of clogging.

For machines or operations which heretofore could not use a coolant pumping system, the Graymills Mist Coolant System will prove invaluable. The mist acts as a refrigerant to absorb heat, thus prolonging tool life. It makes it possible to increase cutting speeds and obtain fine finishes and unusual accuracy in many instances. Graymills Mist Coolant Systems are used on drilling, tapping, milling, sawing and tool grinding operations. They are also useful for cut-off machines and some small lathes. They may be used for lubricating dies on punch presses and other lubricating operations where light viscosity oils are used. They work equally well with water, coolants or oils.



Graymills Coolant Systems have dual outlets

These units are translucent so that the liquid level can be seen at all times without worrying about floats or depth gages.

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INSTRUMENT CHECKS FINE PITCH GEARS TO 0.00001 INCH ON THE PRODUCTION LINE

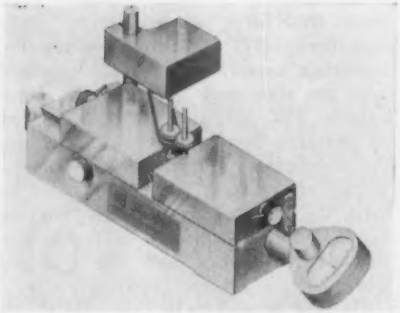
Gears up to 3 inch center distance can be accurately and economically checked during production with the Fine Pitch Gear Rolling Instrument available from Illinois Tool Works, 2501 North Keeler Ave., Chicago 39, Ill. Errors can be evaluated and corrected on the spot, thereby saving inspection rejects and remachining costs.

The instrument's Mikrokator dial gives readings calibrated in 0.00002 inch increments. An indicator calibrated in 0.00001 inch increments is also available, if desired.

Even the smallest and most delicate gears are claimed to be assured of "kid glove" treatment. The instrument is free of excessive pressures, with a new low inertia measuring slide and new method of easily adjusting slide pressures to fractions of an ounce. The constant direct motor drive assures absolute angular velocity and is said to eliminate the chance of human error.

A complete line of accessories is available for checking worms and worm wheels, as well as spur, bevel and helical gears.

The Fine Pitch Gear Rolling Instrument has been designed to withstand rugged production line use. All wear



Illinois Fine Pitch Gear Rolling Instrument

points are hardened and precision ground. The finish on this instrument is non-glare black crackle.

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MACHINE POLISHES FLAT WORK UP TO 6 INCHES WIDE

Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich., has announced its Model FF-6 Flat Finisher, which has been built for wet abrasive belt grinding, polishing and deburring of flat work such as sheets, strips, bars, stampings and plates up to 6 inches wide by 6 inches high.

Heavy duty construction throughout and an endless conveyor belt with variable speed control are said to make the FF-6 an ideal machine for high volume, continuous production.

The FF-6 is available with a single head or, if several operations are necessary, it is available as a multiple head machine. The abrasive belts are carried by two rolls; a powered contact roll and a tracking idler. Vertical adjustment is manually controlled and tensioning on the idler roll is maintained by adjustable air pressure. Head motors ranging up to 7½ horsepower are available.

An electro-magnetic platen is used to hold material on the conveyor belt for positive drive under the contact roll. The magnetic force is variable to suit the size or mass of the work. Correct adjustment of the magnetic force allows parts to move easily off the platen without sticking, lagging or piling up on the conveyor. Hold down rollers, mounted ahead and behind each contact roll, are used when non-magnetic material is to be processed.

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Hammond Model FF-6 Flat Finishing Machine

Spray, mist, fog and splash are trapped by the metal enclosures around each head to insure a clean, dry work area.

For more data circle 121 on Postpaid Card

★ modern machine shop ★

HIGH SPEED BENDING AND EASY HANDLING ARE FEATURED IN BENDER

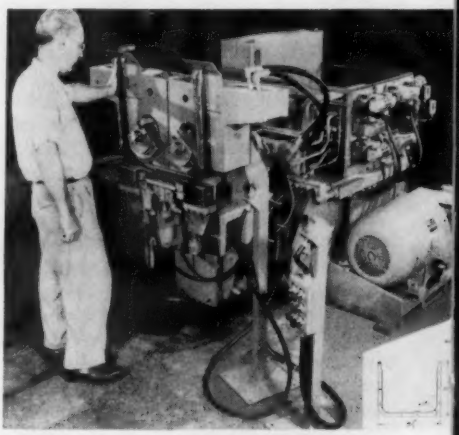
Smooth high speed bending with easy loading and unloading are featured in the Special Bender developed by Pines Engineering Co., Inc., 643 Walnut, Aurora, Ill. The part shown in the accompanying illustration is a steel, U shaped radiator support channel of about 1½ inches overall, which takes two 90 degree bends on a 3¾ inch inside radius. Production is at a rate of 1,000 bends per hour.

Material handling in and out of the bender is facilitated by the vertical design which features two pivoting heads that form two 90 degree bends simultaneously. Operation is simple, requiring merely loading the channel into the dies and pressing the start button. The bending forms, mounted on pivoting heads, move in to clamp the workpiece and begin the bends. Wiper shoes then move vertically to form the channel around the bending forms. After completion of the bends, the heads retract and the finished workpiece is ejected automatically.

Galling is said to be virtually eliminated because the wiper shoes are supported in Ampco bronze ways, which permit the shoes to move with the workpiece during the bending operation. This feature reduces maintenance and gives long die life without special lubrication of the workpiece during the bending operation.

The machine is operated hydraulically with cushion type cylinders which minimize shock at the end of the stroke and prolong the life of the working parts. Power is supplied by a single 20 h.p. motor. All hydraulic valves are panel mounted and accessible for maintenance.

For more data circle 122 on Postpaid Card



Pines Special Bender eliminates galling

CONTOUR CUTTERS FOR FERROUS AND NON-FERROUS MATERIALS

A line of heavy duty port contour cutters for producing the AND 10050 Hydraulic Port Contour Cutter in steels, including stainless, is now available from the Sonnet Tool and Manufacturing Co., 672 North Prairie Ave., Hawthorne, California.

Heretofore, AND 10050 Port Contour Cutters have been designed to do the best job in non-ferrous materials. However, the increasing use of stainless and other high tensile strength materials in hydraulic systems has demanded a more rugged cutter designed primarily for these materials. (The cutters can also be used with non-ferrous materials.)

This cutter produces the AND 10050 contour in a single pass and, when a reamer pilot is used, also sizes the minor diameter of the Class 3 thread specifications.

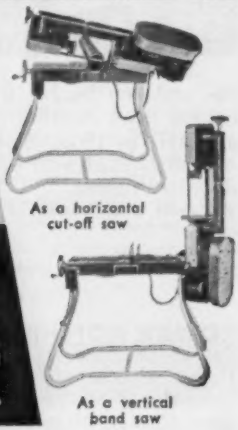
An opposed flute design is utilized to reduce radial pressure. A slightly positive axial rake results in a shear-like cutting action, preventing build-up on the cutting edges and reducing cutting pressures, an advantage particularly when cutting stainless steel.

The shank and body of the tool are made of alloy steel, hardened for toughness. Cutting edges are tipped with tungsten carbide for long life, smooth finish and a maximum number of cuts per grind.

The tool is available with replaceable plain pilots or reamer pilots. As an optional feature, the tool can be provided with carbide wear strips ground to a precision tolerance so that

You CAN take it with you ... or use it in the shop

THE VERSATILE WELLS 49A METAL CUTTING BAND SAW



Use the Wells 49A in the shop, or take it to the "job-site"—you'll find it an efficient tool—a time and money saver on a wide variety of metal cutting jobs.

As a horizontal cut-off tool it has a capacity of 3½" x 6". One easy motion converts it to a vertical band saw. No tools required! Just swing the head into upright position—it's ready to use. Cut angles, slots, do light contour work.

Get TWO saws for the price of ONE! Write for complete information.

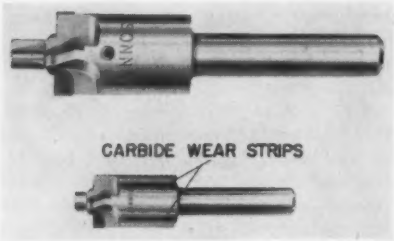
Wells Saws
Wells

The Pioneers of Horizontal
METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
808 Tyler Street • Three Rivers, Mich.

For more data circle 587 on Postpaid Card

new shop equipment . . .



Sonnet AND 10050 Contour Cutters

the tool can be fed through a bushing for extra stability. The cutters are available in 13 diameters for all sizes of fittings used with ⅛ through 2 inch diameter tubing.

For more data circle 123 on Postpaid Card

★ modern machine shop ★

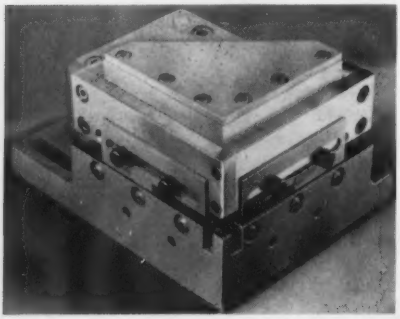
CORNER NOTCHING UNIT

Wales-Strippit Co., Akron, N. Y., has announced the NA ¾ Inch 90 Degree Corner Notching Unit with removable, reversible punch and die blades.

Advantages of the independent notching units are: (1) short ¾ inch dimension from cutting edge to outside face of unit permits close positioning to other units in a setup, (2) punch and die blades are each in two segments which can be interchanged, reversed, turned end for end and top to bottom to present eight cutting edges before regrinding is necessary, and (3) fully guided self-stripping punch, permanently aligned with the die.

The Strippit Notching Units are made in 3 by 3 and 5 by 5 inch sizes, right or left hand, with or without adjustable side gage plates or built in graduated table. Capacities are to ⅛ inch mild steel. Mounting can be done outside the press on mounting templates, tee slotted mounting plates or rails. Nothing is fastened to the ram, which simply contacts a top punch plate to depress the punch to the uniform 5½ inch shut height. Four springs provide uniform stripping and lifting pressure. Each punch and die blade is in two closely machined and fitted parts to facilitate removal. The notching units may be used in the same setup with other self-contained Strippit Hole Punching and Notching Units, and new setups with additional Strippit Units may be kept ready to put in the press as soon as a current run is finished, thus getting maximum use of the press.

For more data circle 124 on Postpaid Card



Wales-Strippit Corner Notching Unit

★ modern machine shop ★

SOLID CARBIDE INSERT AND TOOLHOLDER

Willey's Carbide Tool Co., 1340 West Vernor Hwy., Detroit 1, Mich., has announced the Pentagon Series of solid carbide "thro-away" inserts and toolholders.

The Pentagon Insert has 10 cutting edges. Improved tool geometry in-

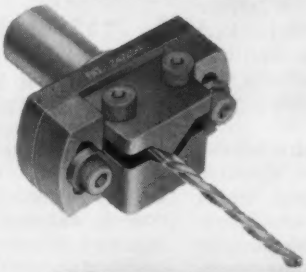
creases the tool life because the Pentagon permits a 30 degree lead angle which reduces the shock to the tool nose. This increase in the lead angle allows the tool to enter the cut more gradually and away from the nose of the insert (less shock to the weakest point). Also, by reducing the end cutting edge angle to 12 degrees, a greater volume of carbide backs up the cutting edge, thereby giving greater edge strength — most important on interrupted cuts or when machining scaly materials.

Positive locking and ease of indexing are important features in the Wil-Dex Pentagon Holder. The positive lock clamp for the insert and chip breaker is supported by an adjustable set screw at the rear of the clamp, which positions the clamp for maximum clamp pressure when the clamp bolt is drawn tight. The spring tension on the clamp bolt facilitates indexing by lifting the clamp when the clamp bolt is loosened, and by keeping tension on the insert and chip breaker, which helps keep them in the holder while indexing.

For more data circle 125 on Postpaid Card

Wil-Dex Pentagon Solid Carbide Toolholder

ACCURATE SET-UPS FAST!



Accurate, rapid set-ups the first time, every time . . . is the reason Brookfield Tool Holders are now widely used in practically every metalworking plant in the country. With one Brookfield Tool Holder, you can cut your stock of bushings by at least 100. Here's why:

BROOKFIELD TOOL HOLDERS

ADJUSTABLE V JAW holds wide range of tool diameters without bushings or accessories.

AXIALLY TRUE DESIGN makes perfect tool alignment almost automatic.

BALANCED-PRESSURE LOCKING ASSEMBLY maintains uniform seating, eliminates creep or shift.

EASY TO USE — just slip tool in the jaw, tighten, then float tool into dead center and lock.

AVAILABLE IN A WIDE RANGE OF SIZES

MODEL NO.	HOLDING RANGE	SHANK DIA.
BA-10	1/64"–5/16"	5/8"
DA-10	1/64"–1/2"	5/8"
DA-12	1/64"–1/2"	3/4"
GA-12	1/16"–3/4"	3/4"
GA-16	1/16"–3/4"	1"
KA-16	1/8"–1"	1"
KA-24	1/8"–1"	1 1/2"
PA-24	1/4"–1 1/2"	1 1/2"
PA-28	1/4"–1 1/2"	1 3/4"

WRITE FOR ILLUSTRATED CATALOG AND PRICES!

BROOKFIELD, INCORPORATED

STOUGHTON 1111, MASSACHUSETTS

For more data circle 588 on Postpaid Card

new shop equipment . . .

SPECIAL DOUBLE END MACHINE

Parts up to 28 inches long can be drilled, centered, spotfaced, chamfered, reamed, tapped, threaded, hollow milled or bored on the versatile machine recently developed by Hartford Special Machinery Co., 27511 Homestead Ave., Hartford, Conn. Designed to perform opposed operations simultaneously, this machine may be used with a small index table, manual or air clamp fixtures, hopper or vibration feeds, and is available with either manual or automatic interlocked cycle. It is also adaptable to multiple head operations and will perform two operations per hole when fitted with an index table.

In the accompanying illustration the Hartford Special Double End Machine is equipped with two standard Model 19-150 hydraulic drill units which provide a drilling capacity of 5/16 inch diameter in mild steel. Tapping capacity is ⅜ inch. With a maximum stroke of 1½ inches, spindle speed range is 300 to 10,000 r.p.m., with a feed range of 0 to 70 inches per minute. The rapid approach rate is 350 i.p.m., the rapid return rate is 300 inches per minute.

Hartford Special Double End Machines are available completely assembled or as separate components for assembly by the user. The base, which is equipped with a coolant tank and pump, chip tank and coolant trough, is 40 inches high, 22 inches wide and 65 inches long. It is a ruggedly constructed steel weldment and requires no special installation.

For more data circle 126 on Postpaid Card

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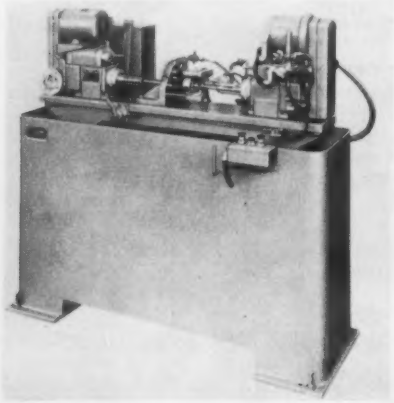
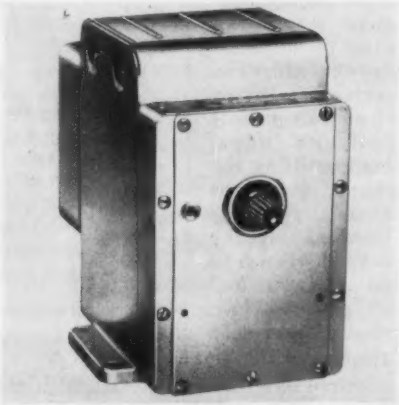
ELECTRIC OIL SUBMERGED MOTOR OPERATOR

An oil submerged, spring return, proportional type electric motor operator, which has been designed to control dampers in heating, ventilating and air conditioning systems in addition to a wide variety of industrial applications, has been added to its motor operator line by Barber-Colman Co., 869 Rock St., Rockford, Illinois.



Hartford Special Double End Machine

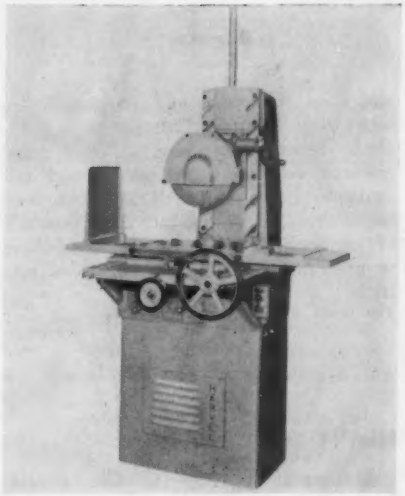


Barber-Colman Oil Submerged Motor Operator

This motor features a gear train and drive completely submerged in oil and sealed in a die cast case. The motor may be mounted in any position. Auxiliary switches are readily accessible and are very simple to adjust. Its output shaft is power operated in both directions to position a controlled device as required when power is on, and maintains this position with an internal holding circuit. An enclosed spring return drives the controlled device to its normal position on a power interruption.

For more data circle 127 on Postpaid Card

SURFACE GRINDER HAS 160 SQUARE INCHES OF TABLE WORKING SURFACE



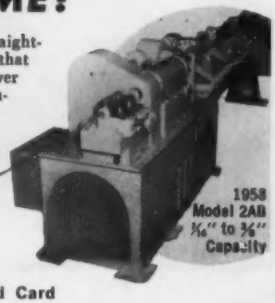
Harvel 10 by 16 Inch Surface Grinder

Harvel Co., 5135 Coffman-Pico Rd., Pico, Calif., recently introduced its 10 by 10 inch capacity surface grinder. The spindle is a direct motor drive mounted on super precision preloaded ball bearings, completely sealed and lubricated for life. The one horsepower, 1,750 r.p.m. motor is included with a pushbutton starter. The motor and spindle are precision balanced. The grinding wheel is 12 inches in diameter. Working surface of table is 10 by 16 inches. Surface of the table is finish ground with each component grinder for precision parallelism and alignment. The back edge of the table and tee slots are ground square to the spindle and may be used for aligning work. Longitudinal travel is operated by a hand feed rack and pinion gear with a large handwheel. With one revolution of the handwheel, the table is traveled a full six inches. The table rides on one vee and one flat way. All feeds are by hand. All handwheels are chrome plated. All shafts are ground

THEY LAST A LIFETIME!

1900 Model SHUSTER

SHUSTER — the oldest name in wire straightening and cutting — makes machines that consistently pay their keep over and over again. Many fifty and sixty year old Shusters are still working a full shift every working day! And today's Shusters give the same full value — send us your specs for wire from .020" to 1 1/16" — and we'll prove that a Shuster pays for itself faster than any comparable machine!



1958 Model 2AB 1/16" to 3/8" Capacity

METTLER MACHINE TOOL, Inc.

157 Adeline, New Haven, Conn.

For more data circle 589 on Postpaid Card

and mounted on ball bearings and are lubricated for life. Other features include telescoping dust guards, hard chrome vertical front ways and adjustable table stops. The cross feed handwheel is graduated in thousands of an inch. The elevating handwheel is graduated in ¼ thousands of one inch.

For more data circle 128 on Postpaid Card

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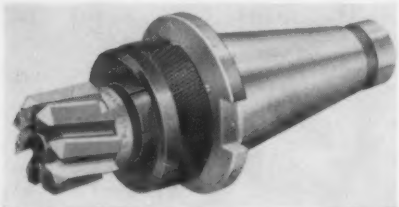
HEAVY DUTY HOLDER

Universal Engineering Co., Frankenmuth 9, Mich., has announced a heavy duty quick change holder which is said to be especially suited to heavy cutting in die sinking and similar operations.

The holder is part of a line of adaptors which the firm calls "Kwik-Switch" types. The heavy duty holder is so designed as to be interchangeable with the regular line of Universal adaptors.

The three piece device has been designed to provide a positive square drive, back-up screw stop and depth adjustment. A collet type adaptor, designed for presetting, is furnished with the holder.

For more data circle 129 on Postpaid Card



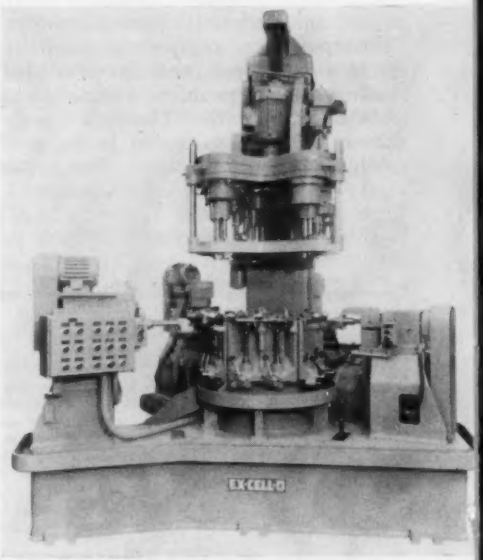
Universal Kwik-Switch Heavy Duty Holder

MULTIPLE OPERATIONS ON MULTI-SPINDLE MACHINE

Ex-Cell-O Corp., Detroit 32, Mich., has developed a special five station, multi-spindle vertical machine, which performs numerous drilling, tapping, spotfacing, counterboring and chamfering operations on cast iron distributor bases.

Construction-wise, the special machine is composed of a heavy duty base on which is centrally mounted an electro-mechanical indexing table carrying a five station, two compartment fixture. Circularly located on the base and adjacent to the fixture table are three standard hydraulic power units and a tapping head for horizontal and angular operations. The vertical column of the machine carries a special multi-spindle drill head mounted on a hydraulically operated slide.

In operation, the parts are manually loaded first into the right hand com-



Ex-Cell-O Special Multi-Spindle Machine

partment of the fixture. After a complete revolution passing into each of the four work stations, the parts are unloaded and reloaded into the left hand compartment. The fixture again revolves around the work stations, after which the processing is complete. The fixture provides for automatic orientation of the workpieces and production is 150 distributor bases per hour.

For more data circle 130 on Postpaid Card

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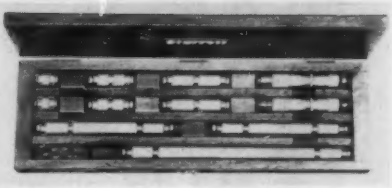
SATIN CHROME PRECISION END MEASURING RODS

Sets of highly accurate end measuring rods, for use with jig borers and other machine tools where spacings and table settings must be held to a high degree of precision, have been announced by The L. S. Starrett Co., Dept. MD, Athol, Mass. No. 244 Series Rods are available in 1, 2, 3, 4, 5, 6, 7, 8, 10, 12 and 15 inch sizes (also in Metric) and may be purchased in standard sets or in any combination of sizes to suit specific requirements. Also available are two micrometer heads, each of 4 to 5 inch range, graduated to read in ten thousandths inch (or hundredths of a mm.).

The micrometer heads are identical except that one has a red ring and the other a black ring for ready identification when both are in use. Both have no-glare satin chrome finish for easy reading and corrosion resistance, hardened screws are ground from the solid and stabilized, quick reading figures with every thousandth numbered, contacts precision ground and lapped and lock nut.

The end measuring rods are made of fine tool steel with satin chrome finish and precision ground and lapped contact faces. Each rod has several concentric collars of ⅝ inch diameter which are ground concentric, parallel and square with the contact faces. These serve as bearing surfaces when the rod is placed in the groove of a machine tool and also facilitate handling.



Starrett No. 244 End Measuring Rods

For more data circle 131 on Postpaid Card

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CHROME THREAD WORK PLUGS

Stock delivery of long wear Durplate Chrome Thread Work Plugs has been announced by the N. A. Woodworth Co., 1300 East Nine Mile Rd., Detroit 20, Michigan.

Both taperlock and reversible, in sizes from No. 0 to 1½ inch in American National Coarse, Fine and Extra Fine series, are available.

For more data circle 132 on Postpaid Card

Woodworth Durplate Chrome Thread Work Plugs

OUTSTANDING
on both sides

modern machine shop
ADVERTISER
• Biggest circulation in metalworking 54,000
• Plant circulation .....over 34,000
• Lowest cost per thousand circulation $6.10

Whether you're a reader or an advertiser, you profit from your use of MODERN MACHINE SHOP. As an advertiser, naturally, you're interested in a metalworking publication that meets your requirements as to readership, market coverage and cost. At the same time, consider the acceptance that the magazine enjoys with the reader.

Readers of MODERN MACHINE SHOP know that in every issue they'll find valuable editorial information to help them in their jobs. The handy, pocket size book is easy to carry and to read at convenient opportunities. Every issue brings heavy response, indicating intense readership and acceptance of MODERN MACHINE SHOP as an important part of the work day.

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READER

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- Something of interest for every reader

NBP

BPA

TAKING
STOCK
IS GOOD
BUSINESS
If you're in business, you take inventory at least once a year.
It's essential to the health of your business to know wher
stand. But have you taken stock of yourself
know where you stand when it co
A once-a-year he
The
tell you.
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300,000 Americ

ntory at least once a year.
of your business to know wher
have you taken stock of yourself
know where you stand when it
A once-a-year
The
tell you.

ng cancer are far greater when it is
arly and treated promptly. Living proof are the
800,000 Americans who *have been cured.*

Yet lung cancer now kills 24,000 men annually...eight times as many as twenty years ago. And thousands of these deaths could have been prevented *if the cancer had been diagnosed early and treated promptly.*

That's why it's vital for every man to have a health checkup every year, including a chest x-ray. Further, if a cough or hoarseness lingers for more than two weeks – one of cancer's danger signals – an immediate visit to the doctor is indicated.

Give yourself the same break you give your business. Take that personal inventory regularly – have a health checkup every year.

AMERICAN CANCER SOCIETY

where to get it

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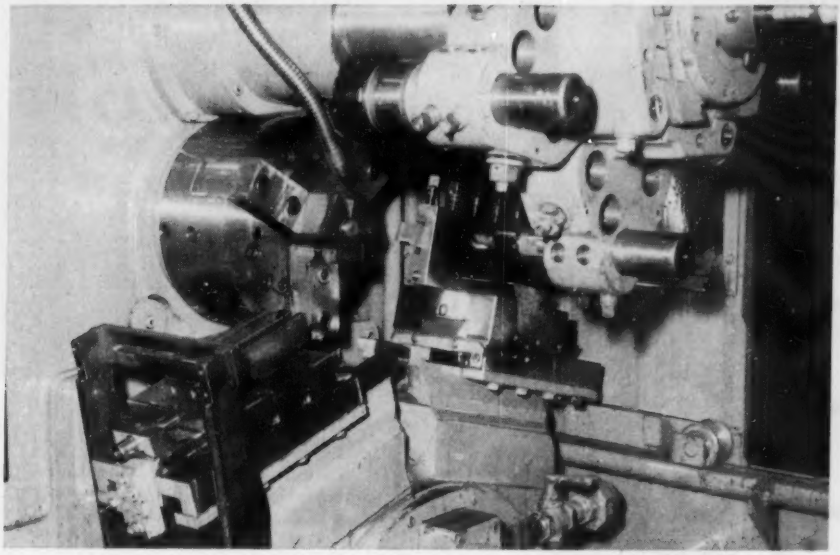
WARNER & SWASEY with *Buck* AJUST-TRU® POWER CHUCK

"Repeats to .0005*, reduces scrap"



If you use automatics this report from A. F. Gabriel, V-P Eng. & Prod., Acme Industrial Co., Chicago, should be of value.

"We have set up your 10" air operated chucks as standard equipment on our machines . . . many parts require repeat chuckings . . . most have extremely close concentricity requirements. With Buck chucks we can repeat to tolerances of .0005* and less . . . your chuck has allowed us to improve quality and has reduced our scrap."

It pays to chuck with Buck! Send for catalog — see why.

** Although Acme does better, the guaranteed precision of Buck Power Chucks is .001"*

BUCK TOOL COMPANY

114 SCHIPPERS LANE • KALAMAZOO, MICH.

For more data circle 590 on Postpaid Card

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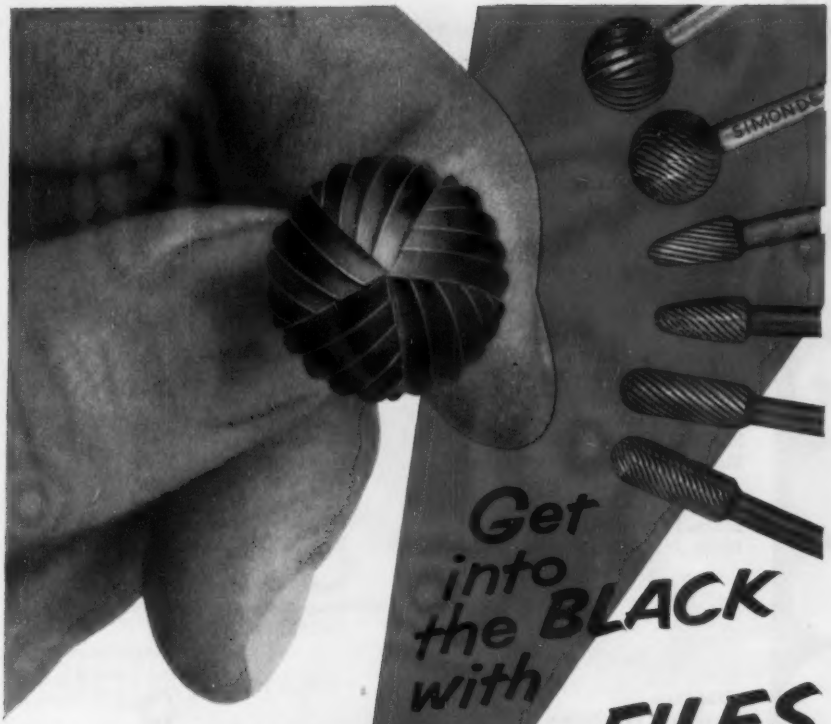

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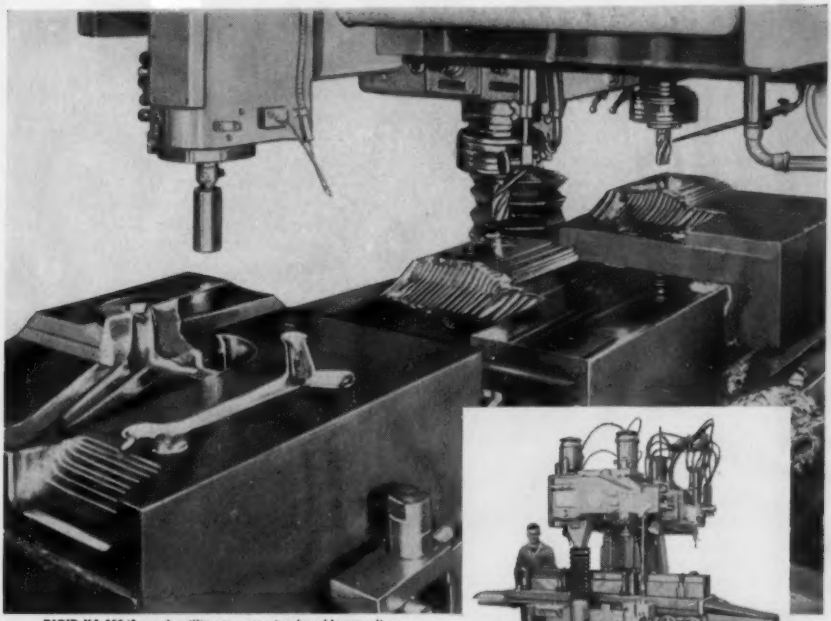
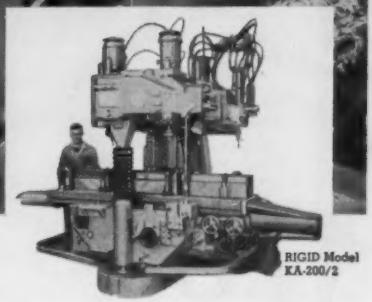


RIGID KA-200/2 rough milling two steering knuckle arm dies



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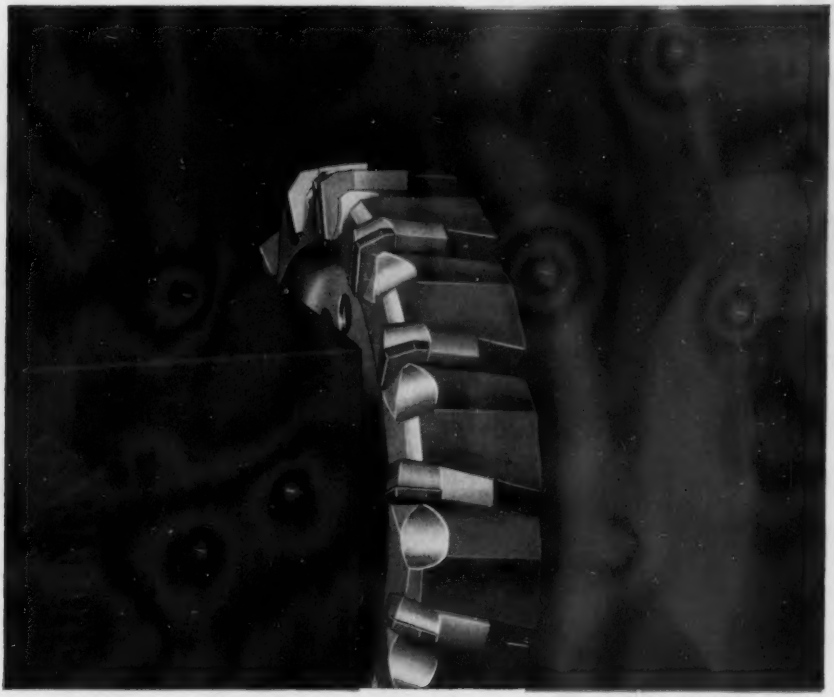
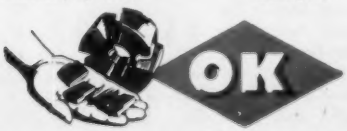


How Heppenstall's hogmill forged die blocks with OK facemills

Close-up made at Heppenstall's Bridgeport shows a 1500 pound, 12 x 20 x 20 inch, Hardtem B forged die block being rough milled with a 14 inch O K 9614XX, extra heavy-duty carbide insert blade facemill, incorporating 10 degree negative axial and radial rake angles. Feed, 150 surface feet per minute. Speed, 8½ inches per minute. Depth of cut, ¼ to 5/16 and often up to ½ inch. Machine, a rebuilt vertical miller with 60 horsepower motor and heavy fly wheel.

IT IS THE SAME STORY EVERYWHERE. Tool engineers prefer O K carbide insert blade cutters for all kinds of tough milling operations . . . facing steel forgings, die blocks, locomotive driving rods, steel castings. There's a reason for this preference. It can be demonstrated by counting the minutes and measuring the metal removed. O K cutters are scientifically designed with various combinations of positive and negative axial and radial rake angles. Scientific designing directs the cutting forces into the body of cutter instead of transversely to the cutting edges. This is necessary because carbides have high compression strength and low transverse rupture strength.

O K cutters are the simplest, the strongest and the toughest ever built. They are heavier, huskier, with more beef in the body. The simple two-piece construction – body and blade – provides more strength and weight to better stand the heavy pull of high powered modern milling machines. Blades are wedge-shaped blocks, the wedge being the strongest mechanical device man has devised. One side of each blade is serrated. Matching serrations are cut into the body. Blades are self-locking, cannot tip or slip. No pins, screws, gibs or locks are needed. To compensate for wear, blades are stepped out one serration and reground. A new set of blades gives you a new cutter. Put your milling problems up to our tool engineers. Write for Catalog 13.



modern milling cutters for modern milling machines

THE OK TOOL CO., INC., 800 Elm Street, Milford, New Hampshire

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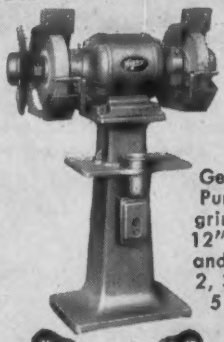
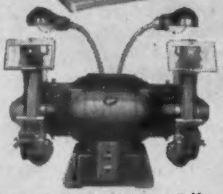
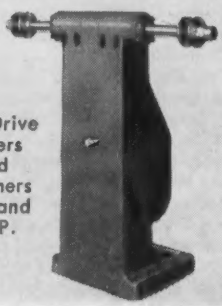
Wide range Precision grinders with internal-external grinding heads. ¼, ½, 1, 2, 3, 5, 7½, and 10 HP.



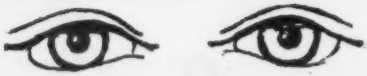
General Purpose grinders, 12", 14" and 18" 2, 3 and 5 HP.



Bench grinders, 8" to 12", ¾, 1 and 2 HP.



Belt-Drive Buffers and Polishers 2, 3 and 5 HP.



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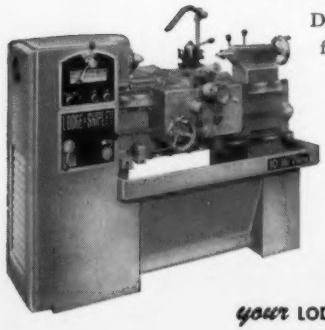

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